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Fodder Crops for Australia

By
Leslie H. Brunning



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F. H. BRUNNING PTY. LTD.

64 ELIZABETH ST., MELBOURNE

Bulk Stores and Cleaning Plant: 22 Hanna St., South Melbourne

Australia

A FEW INTERIM REPORTS ON HUBAM

The New Annual Giant White Sweet Clover

Reference to the new Annual Giant White Sweet Clover, or to give it its correct title, Hubam, is made on page 94 of this booklet. These remarks were written when the book was being compiled in September/October, 1921, but now, just as publication is being completed, some interim reports have come to hand regarding this new annual Summer Fodder, which will no doubt be of interest to readers.

The actual reports are appended herewith.

14th January, 1922.

"Yours of the 4th inst. to hand. Re Experimental Plots:—The two plots were planted on 14/10/21 and we had 52 pts. of rain the next day. The total rainfall to date since planting is 197 pts. Scarified twice and watered twice (irrigation) and now the Hubam Clover is an average height of 4 ft., out in flower and seeding well, while the Sweet Clover is 2 ft. high, and of course not out in flower.

"Estimate the cut of hay from Hubam would be four times that of the Sweet Clover. There is no comparison between the two. Can send you samples of each when we cut them."

(Sgd.) PEARCE BROS., "Poon Boon," Tooleybuc, via Swan Hill.

5th January, 1922.

"As requested, I beg to report how your newly-imported seed Hubam did.

"It is now over 7½ ft. high, and well furnished, and in full bloom. I feel sure it will make a very heavy cropper, and looks good feed. One would think it was Lucerne crossed with some other plant."

(Sgd.) T. S. EDGE, Knockreagh, Rochester.

12th January, 1922.

"Re HUBAM: It was sown on Nov. 6th, and first cutting made on Jan. 8th. Average height, 2 ft. 3 in. The flower heads were just forming; the cows would not eat it, but the horses are fond of it. This, of course, is nothing unusual with a new fodder.

"Once the weather warmed up it made very vigorous growth. When cut it has a peculiar smell unlike any other Clover I know of. An acre or so of it making as good growth as the small plot would certainly provide a great body of feed, but of course unless the feeding value of the plant is exceedingly high, it would not pay to sow it at anything like the present price of seed."

(Sgd.) P. A. McANULTY, Stanhope.

8th January, 1922.

"In reply to your letter of 6th inst., asking for report upon sample plot of 'Hubam' grown here, I would state:—

"HUBAM: Planted in Sept. was not a success. It grew to about six inches and petered out.

"Later sowing in first week of October, germinated quickly but was slow in getting a 'go' on, and it is only during the last month that it has made wonderful growth, reaching over 4 ft., and showing a small, white flower.

"Considering it has done so well on poor, sandy soil, with only slightly over an inch of rain during the 3 months, shows that it must be a record cropper in this district under better conditions.

"'Hubam' has a straight stem with smaller branches at intervals of 6 inches, and resembles the young tree Lucerne or 'Tagasaste,' but, of course, much finer in texture.

"Is the finest plant I have yet seen. The small plot I have is a real picture, but, of course, I am unable to give any particulars as to its value as a fodder, though I feel sure it must be superb."

(Sgd.) ARCH. STRINGER, Ensay, East Gippsland.

1st March, 1922.

Further to my letter of the 8th January, my "Hubam" now beats your Rochester client, being over 8 ft. high, and still climbing.

Considering the long dry spell locally (over 4 months with less than 1 inch of rain), it has done remarkably well, and should prove a splendid drought-resister.

Planted in the orchard, I was unable to feed it off, but cut one of the rows for horses, and they ate every leaf and looked for more. The cut plants grew again strongly and are now 3 ft. high, with a fine growth.

In my opinion, Hubam ranks next to Lucerne as a fodder, and I trust you will reserve me a good parcel of seed for next season.

Yours faithfully,

(Sgd.) ARCH. STRINGER, Ensay.

(Continued on inside page, back cover).

FODDER CROPS

— FOR —
AUSTRALIA

(Copyright 1922)

BY
LESLIE H. BRUNNING

FIRST YEAR OF BUSINESS 1852
SEVENTY YEARS CONCLUDED 1922

PRICE, 2/6

F. H. BRUNNING PTY. LTD.

64 ELIZABETH STREET, MELBOURNE

BULK STORES: 22 HANNA STREET, SOUTH MELBOURNE

AN IMPORTANT BRANCH OF THE SEED BUSINESS

BRUNNING'S BULK STORE, FARM SEED DESPATCH DEPARTMENT AND SEED CLEANING PLANT AT SOUTH MELBOURNE

The illustrations below represent an outside and an inside view of the capacious and well-fitted Bulk Store and Cleaning Works of F. H. Brunning Pty. Ltd. This Store, which is an unencumbered freehold property belonging to F. H. Brunning Pty. Ltd., was acquired by them in January, 1920.



External view of Brunning's Bulk Store, 22 Hanna Street, South Melbourne. The left-hand side (No. 1 Store) is devoted to Storeman's Office and Storage Purposes, while the Upstairs portion is utilised as a Sorting Room for hand-picking Beans and Peas for Export.

Half of the right-hand side building (No. 2 Store) is devoted to Cleaning Machinery, the balance being used for Storage Purposes.

The right-of-way in between the two buildings was specially retained in order to facilitate speedy loading and unloading. (See illustration on page 68.)



An inside view of No. 1 Store, taken in January, 1921, prior to the arrival of the season's large consignments of Cocksfoot, Rye Grass, Lucerne, Rape, Clovers, etc. In the busy season, the passage ways are only wide enough to permit of efficient stacking and speedy handling.

PREFACE

There have been many valuable books published on Agriculture generally and Fodder plants in particular, including several on Australian Native Grasses, etc., but the actual question of suitable Fodder Crops for Australia is one that has been hitherto neglected.

Instead of the old custom of devoting a section in a General Seed Catalog to Agricultural Seeds, a practice which is merely a classification and which, owing to fluctuating prices, can be more adequately filled with an ordinary price list, Messrs. F. H. Brunning Pty. Ltd. requested me, as a souvenir of this, their 70th year of business, to compile a work on "Fodder Crops for Australia," making the contents of this book quite distinct from the ordinary Seed Catalog, with the idea of making the publication a useful and valuable reference work for Cultural Information, Utility, etc., of the best of the Fodder plants suitable to this great Continent.

Space has in many cases necessitated abbreviation, and the magnitude of the task set would have been appalling but for the very kind assistance so cheerfully and freely given in the matter of practical experiences, loan of blocks, use of photographs, etc., by the various gentlemen whose names appear throughout these pages. Space does not permit me to thank each in detail, but I trust that this general appreciation of their courtesy will be accepted in lieu thereof.

I also desire to thank the Editors of both the Victorian and S.A. "Journals of Agriculture," for their kind assistance in the matter of blocks and photographs.

The task set was a rather difficult one, but the work has been "A Labor of Love," rendered much lighter by the assistance so freely given, and if in my endeavors, I have been successful in helping "The Man on the Land," to increase the productivity of the soil, which is the main source of our national wealth in Australia, I shall be well repaid for the work done.

These four valuable legumes, "TARWEI" Strawberry Clover, Subterranean Clover, Sweet or Bokhara Clover and "Mesgawi" Berseem Clover are dealt with very fully and at length, whilst the question of "Stock Poisoning" by the Sorghums and Sudan Grass is treated in such a manner as to prevent any serious danger from this source provided the advice given is duly respected.

Two special features of the booklet are the experiences of successful practical men which are given in connection with many of the fodder plants listed especially the Sorghums, Genuine "GARAWI" Sudan Grass, "TARWEI" Strawberry Clover, Subterranean Clover and "MESGAWI" Berseem Clover, and the article on pages 119 to 123 dealing with the laying down of a Permanent Pasture Mixture of Grasses and Clovers on land commanding irrigation in the Northern parts of Victoria as a valuable supplement to and not instead of LUCERNE.

The new Giant Annual White Sweet Clover "HUBAM" is dealt with on page 94, but it is not possible to do more than merely mention same until the suitability of this plant to Australian conditions has been demonstrated.

Space did not permit the inclusion of a section on the various grain fodders such as Oats, Barley, etc., and these plants have necessarily to be left over until some possible future edition.

LESLIE H. BRUNNING.

Melbourne,
1st February, 1922.

SECTION 1—ROOT CROPS

Root Crops were developed primarily for use as human food, and in their more highly selected forms are still grown for that purpose. The varieties grown for forage are larger and coarser, and they produce much heavier yields.

The principal root crops, excluding Potatoes and Onions, are Mangel, Sugar Beet, Sugar Mangel, Swede, Field Turnip, Field Carrot and Chicory. Experts have placed them in the following order as regards feeding value:—Sugar Mangel, Sugar Beet, Mangel, Swede, Carrot, Field Turnip. Chicory as a root crop is not used for fodder purposes, but for grinding down for mixing with coffee.

Root Crops require a deep, rich, friable, sandy-loamy soil. It is essential that the subsoil be well drained to allow the roots to penetrate easily and attain full development, and stiff clayey land of compact texture or hard stiff ground retards the development of the roots and is unsuitable for their successful cultivation. Thorough soil preparation is essential for the best results.



Sugar Beet Crop at Cowwarr.

WHEN TO SOW AND SUITABLE VARIETIES.—As the period of sowing the different kinds of Root Crops varies slightly, particulars are here given in detail.

Sow the seed of Mangel from September to December, using the Long varieties for deep soil, and Globe sorts for shallow ground. The best varieties of Mangel are Champion Yellow Globe, Golden Tankard, Mammoth Long Yellow and Mammoth Long Red.

The best months for sowing Sugar Beet are September, October and November, using either Vilmorin's Improved, Wanzleben or White Silesian.

The Giant Half Sugar Mangel, which is superior as a stock food to both Mangel and Sugar Beet, only includes two varieties, the Giant Half Sugar Rose and the Giant Half Sugar White. These sorts are of equal excellence, and only vary in the colour of the top. The seed may be sown from September to December.

FODDER CROPS FOR AUSTRALIA

ROOT CROPS. (Continued.)

Swede seed may be sown from October to January, the best months being December and January. The best varieties are Champion Purple Top, Skirving's Purple Top, Elephant Purple Top, and Defiance Purple Top.

While Swedes are best suited to soils of a comparatively heavy nature, the Field Turnip will do well in all dry soils, from the poorest sand and gravel to the richest loam. Seed may be sown from October to December, and the following varieties are recommended for this State:—Purple Top Yellow Aberdeen, Green Top Yellow Aberdeen, White Stone, Purple Top Mammoth, and White Globe.

The Field Carrot thrives best on loose, sandy, friable loam, although good results may be had even on poor, soft sand scarcely able to produce any other crop. The best months for sowing the seed are September and October, although late seedings may be made up to the middle of February, and White Belgian, Red Altringham, Sinclair's Champion and Yellow Belgian are the four best varieties for the Australian climate.



Harvesting Sugar Beets.

Seed of all the root crops is sown in drills, the distance between which, and the quantity of seed required per acre, varies according to the particular sort. The germination of Sugar Beet and Sugar Mangel may be hastened by soaking the seed, and with all the Root crops it is necessary to draw a light roller over the ground after seeding, in order to compact and firm the soil around the seed. The distances apart, and the quantities of seed per acre are as follows:—

MANGEL.—Drills 36 to 48 inches apart. 4 lbs. per acre.

SUGAR BEET.—Drills 18 to 21 inches apart. 8 lbs. per acre.

SUGAR MANGEL.—Drills 21 to 24 inches apart. 6 lbs. per acre.

SWEDE.—Drills 30 to 36 inches apart. 2 to 3 lbs. per acre.

FIELD TURNIP.—Drills 30 to 36 inches apart. 2 to 3 lbs. per acre.

FIELD CARROT.—Drills 30 inches apart. 4 lbs. per acre.

STORAGE.—The following conditions are necessary for successful storage:—

1. Protection against frosts.
2. Prevention against sweating.
3. An even temperature and good ventilation, to carry off the gases that are likely to accumulate.
4. Proper care, both against damp, which is liable to cause decay, and too dry a place, which will cause the roots to shrivel.

SOW ONLY BRUNNING'S PURE RELIABLE SEEDS

ROOT CROPS. (Continued.)

CULTIVATION.—When the seedlings are well above the ground and can easily be seen in the rows, give the land between the rows a light scarifying to loosen the soil and to destroy any weeds that may have sprung up. Any strong growing weeds that appear in the rows before the plants are ready for thinning out must be carefully pulled by hand. When the plants are from 3 to 4 inches high, it is time to thin out, and this is usually done with a hand hoe. The plants are later on singled out by hand, leaving plenty of room between each for the development of good sized roots. For this purpose, the following distances are required:—

Sugar Mangel, 12 inches.	Mangel, 15 to 18 inches (according to variety).
Swedes, 18 inches.	Carrots, 9 to 12 inches (according to variety).
Turnips, 18 inches.	Sugar Beet, 9 to 12 inches (according to variety).

After thinning out, the only attention necessary until the roots are ready for lifting, is to occasionally scarify the land between the rows, and to hoe the ground between the plants. If the land is worked three times before thinning out, it will generally prove sufficient, as cultivation can only be practised while the plants are comparatively small; when the plants have grown sufficiently to meet each other in the rows, they will smother any weeds.



Lifting the Roots.

LIFTING THE ROOTS.—Root crops are grown in many instances to be stored for Winter feed, and the work of lifting the crop must be carried out when the weather is dry and the soil in good workable condition. Lifting must be done before the plants develop a second, or new growth, or their feeding value will be minimised. The easiest method is to take out a deep furrow on either side of each row with a plough, and there will then be no difficulty in lifting the roots.

When intended for storing, the leaves, together with all earthy matter, must be removed, and the roots thoroughly washed and cleansed, although this is really essential in any case. For dairy cattle, it is advisable to cut the roots into slices so that the animals will receive the full benefit of the food without undue waste, but for pigs they may be fed whole as lifted.

SECTION 2—BRASSICAS

(Silver Beet is included in this section for the sake of convenient grouping.)

CHOU MOELLIER

(Marrow-stemmed Tree Kale.)

Chou Moellier is a rapid growing member of the Kale family, unsurpassed as a milk producer, especially as it does not taint like many other fodder plants. The herbage produced, in addition to being highly nutritious and very palatable to stock, is practically harmless, there being no fear of bloat or scouring with this crop. The plants grow between 4 and 5 feet high, carrying a main stalk which has a sweet and juicy pith or marrow, hence the common name. This main stalk is solid and from 5 to 6 inches in diameter. There are two varieties, the White and the Purple, which are of equal merit, and only vary in the color of the stem.

GENERAL REQUIREMENTS.—Chou Moellier is a member of the Brassica family, and the climatic conditions, soil requirements, and the method of preparing the ground are the same as recommended for Rape (see page 8).

SOWING THE SEED.—Chou Moellier is planted in rows 24 inches apart, sowing 2 lbs. of seed per acre. Seeding may be commenced with the first Autumn rains in March, and successive sowings continued right through until the end of October, although the best results are generally obtained from Autumn or early Winter seeding.

SUBSEQUENT TREATMENT.—In order to allow Chou Moellier to develop properly, thin out when the seedlings are about 3 inches high, allowing from 12 to 14 inches between each plant in the rows. The method of seeding Chou Moellier permits of cultivation to keep down the weeds where necessary, but the plants grow quickly, and after one or two cultivations the land is clean, when no further treatment is necessary. As the plants grow, cut the leaves off once a fortnight. Be especially careful to cut and not pull the leaves, as pulling destroys the new shoots, thereby shortening the period of usefulness of the crop. By the time the leaf supply has been exhausted, the stems will be thoroughly developed, and can be chaffed together with the remaining top leaves.

WHITE MUSTARD

(*Sinapis alba*.)

A useful member of the Brassica family, White Mustard is seldom grown by itself for forage purposes, and is almost invariably sown in mixtures with Rape seed, as described on page 10.

While the plant has a certain value for ploughing under for green manure, its especial value is as an antidote to, or rather a preventative of "bloat" in stock fed on Rape. Sown by itself from 8 to 10 lbs. of White Mustard seed is required per acre, but sown in mixture with Rape from $\frac{1}{2}$ lb to $\frac{3}{4}$ lb. per acre is ample. White Mustard is also useful for cleansing the land, although in this respect it is secondary to Rape.

Climatic conditions, soil preparation, method and time of seeding are the same as for Rape (see page 8).

White Mustard as a seed crop is of high economic value, and when grown for this purpose, is seeded in rows 30 inches apart, and cultivated regularly. The crop is harvested with a self-rake reaper, and stacked on tarpaulins, afterwards being threshed or flailed. The yields are fairly high, and when an outlet is assured for the seed, White Mustard for this purpose is a highly profitable crop. The Brown Mustard also required by manufacturers is grown similarly to the White (or rather Golden) Seeded variety.

RAPE

(*Brassica napus*.)

Rape is a native of temperate Europe, and is valuable as a fodder plant, for green manuring and for oil. Like the other Brassicas, it is best adapted to a cool growing season, and for a heavy yield, rich, moist soil is required. Rape may be regarded as practically an "all the year round" fodder. It is very hardy, and withstands the Winter well, and although the best results are obtained from Autumn and early Winter sowings, still, seedings may be also made from the beginning of August to as late as the end of October and good yields secured. Rape, therefore, may also be classed as a Summer fodder.

Amongst the forage crops possible and profitable of cultivation in this State, none seems worthier of more extensive use than Rape; it is simple of culture, makes a strong, rapid growth, adapts itself readily to various soils and climatic conditions, responds readily to fertiliser and good cultivation, and, most important of all its useful qualities, it is a palatable, wholesome and nutritious green food for fattening sheep or pigs, for grazing horses or for bringing cattle to prime condition for marketing. It is principally used for green forage, hardly ever being cured for hay.

In feeding value Rape is about equal to Lucerne, and being quickly grown, it is always likely to maintain its place for Summer forage where climatic conditions are suitable, even where the "King of fodders" can be successfully grown. The carrying capacity of Rape will be appreciated when it is realized that from 10 to 30 sheep can be fattened per acre, according to the size of the crop. Rape is also valuable as a soiling crop.

SOILS AND PREPARATION OF LAND.—Rape does best on very loamy ground of good quality, and on sandy soil well manured; low-lying heavy clay or badly-drained soil is most unsuitable, and where deficient in this element, the ground is much improved by a heavy dressing of lime. An Autumn and Winter fallow for Spring sowing, or a Summer fallow for Autumn seedings very much improves the land, and as the seed is small and requires a fine seed bed, soil preparation must in all cases be thorough. Proper drainage is also most necessary to success.

SOWING THE SEED.—Rape must be sown shallow to obtain good germination, half an inch being deep enough, and even in very loose soils the limit depth is 1 inch. Bear in mind that the heavier and stiffer the soil, the shallower the seeding. Rape is generally sown broadcast, in which case 4 lbs. seed per acre is sufficient.

The best method of broadcasting Rape is with a Cahoon Hand Sower, which sows the necessary quantity accurately. Scatter the seed on the surface with the Cahoon Sower, then brush harrow and finish off with a plain heavy roller to compact the soil around the seed. Too dense seeding causes crowding of the plants and smaller growth, and the quantity recommended should not on any account be exceeded.

Rape is also sown in rows with a grain drill and cultivated, the width between the rows generally varying from 24 to 36 inches apart; when seeded in drills, from 1½ to 2½ lbs. of seed per acre is required according to the distance apart. When planted in close rows, say 7 inches apart with a grain drill from 3 to 3½ lbs. seed will be needed to sow an acre, but there is no advantage over broadcasting in this method.

When Rape is grown in wide drills, cultivation should be thorough, a light horse-scarifier being worked between the rows to keep the surface soil loose, and to destroy any weeds that may have sprung up. Two or three scarifyings will be all that is necessary on fairly clean land, as the plants soon develop when the broad leaves will smother the weeds. This cultivation, which is especially essential when growing Rape for Summer Fodder in arid districts, will also help to conserve the soil moisture so important in the successful growing of Summer Fodder crops.

CULTIVATE FREQUENTLY TO CONSERVE SOIL MOISTURE

FODDER CROPS FOR AUSTRALIA

RAPE. (Continued.)

TIME OF SOWING.—Rape is most extensively used as a Winter or early Spring forage, in which case it is sown in the Autumn or early Winter, after the first rains in March up to the middle of June; but, as a Summer fodder sow from beginning of August to end of October, the period of seeding being limited according to the season. For drier districts, the earlier sowing is necessary.

PASTURING.—Allow Rape to get well up, say, about 12 or 18 inches high before feeding off, but put the stock in before the flowering stage, when the crop can be eaten down fairly close, after which there must be a spell to enable fresh growth to take place. A grass and clover paddock to which stock may have access at the same time as they are running on the Rape is of great advantage, as it helps to provide a balanced ration whilst spelling the Rape.



A Field of Brunning's Broadleaved Dwarf Essex Rape.

Do not put stock on to well-grown Rape whilst hungry, as they are liable to get blown; the best method is to run them through the Rape when the dew is off and the sun has been on the crop a few hours. If only allowed 10 or 15 minutes the first day, a little longer the second, gradually increasing the time, they will be found to suffer very little, although some cases are liable to occur at all times.

Rape is usually utilised for pasturing sheep and pigs, although cattle and horses eat it readily, but destroy a considerable portion by trampling, and therefore where intended for this purpose, sow the Rape in rows, which tends to minimise the loss. Cattle feeding on Rape, will consume a larger amount of salt than usual, and this must be freely supplied, as it seems to prevent the purging effect, which Rape often produces. Care must also be taken to prevent bloat.

FOR GREEN MANURING.—Rape is a valuable crop for improving the land, and ploughed in for green manure, leaves the soil in much better condition for succeeding crops. Though not a legume, it deposits a quantity of nitrogen and phosphoric acid, a fair supply of potash, and a large amount of humus in the shape of decaying root matter. Autumn-sown Rape is best for soiling, pasturing through the Winter and ploughing under in the early Spring when about 10 inches high.

READ ABOUT SWEET CLOVER ON PAGE 54

RAPE. (Continued.)

IN MIXTURES.—Sheep and cattle fed on Rape only, are liable to scour, and for this purpose from $\frac{1}{2}$ to $\frac{3}{4}$ lb. White Mustard per acre is generally sown with Rape, and materially assists in counteracting the trouble. This mixture is used almost more extensively than Rape alone, even when the crop is afterwards intended for ploughing under, and Mustard is equally as valuable as Rape as a green manure plant.

Sowing Rape in the rows between Maize at the last cultivation is frequently practised in America, and where sufficient moisture is available for both crops, good results are obtained. This method might be advantageously tried in some of the Maize-growing districts in Gippsland.

Rape is also sometimes sown in the Spring with Red Clover, and the crop pastured in the Autumn and early Winter. This mixture is liable to blow stock, and care must be taken when feeding off.

"REORDERS OWING TO SATISFACTION WITH PREVIOUS LOT."

Messrs. F. H. Brunning Pty. Ltd.,
MELBOURNE.

"Lynwood,"

CLYDE.

1st April, 1920.

Dear Sirs,

I wrote to you yesterday, saying owing to advanced price of Rape seed, we would sow Oats instead, but seeing the splendid strike of previous seed purchased from you, have decided to order the 112 lbs. of Dwarf Essex Imported Rape Seed at 140/- per cwt., as quoted by you on the 26th, by letter.

(Sgd.) W. G. LITTLE.

RAPE SEED OIL.—Rape seed is largely used in the manufacture of Colza oil, so valuable for wounds and burns. Rape seed oil is also suitable for lubricating and lighting, and the seed-cake is valuable as a stock feed and fertiliser.

SEED SELECTION.—There are two types of Rape—the annual or Summer, and the biennial or so-called Winter Rape. The Summer Rape is principally grown for its oil and for bird seed, and is of little or no value for fodder purposes. Of the biennial Rape the principal type—in fact, the only one worth discussing—is the Dwarf Essex, which is the variety used for fodder purposes, and the best seed of which is grown in England, Holland and New Zealand. Farmers should, therefore, be careful to see that the seed they sow is the produce of one of the above-mentioned countries.

French-grown Dwarf Essex Rape has also been satisfactorily grown in this State, but has not been considered equal to that grown in England, Holland or New Zealand. Rape from Japan is generally only used for bird seed, but during the recent Great War, the high price ruling for English Rape, and the scarcity of that seed, caused many farmers to buy Japanese grown seed from Japan. In some cases the results were equal to those from English, Dutch or N.Z. seed, in others very poor and yields practically nil.

There does not appear to be any special fixed type in Japan, both Dwarf Essex and Summer Rape being produced there. In many cases the produce of the Japanese seed has turned out to be only Turnip Rape, which is actually a variety of Turnip grown for the sake of its oil-bearing seed, and one which does not make root. The plants of this type will grow on poorer land than Dwarf Essex Rape, but having thin, rough, hairy foliage, not smooth and fleshy like the Dwarf Essex, yield much less forage of a very poor quality, and distasteful to stock. The seeds of Turnip Rape are generally smaller than those of the Dwarf Essex variety, more deeply marked, and often of a greyish-black colour.

Farmers are warned not to plant this type, and only to procure seed of the Dwarf Essex Rape from reliable sources. Brunning's Dwarf Essex Rape is guaranteed to be the genuine article, and to produce a first crop under reasonable conditions, and English grown, Holland grown or New Zealand grown seed is available as desired.



THE BEST SEED IS THE CHEAPEST USE BRUNNING'S



SILVER BEET

(*Beta vulgaris argentea*.)

Silver Beet is a very valuable pasture for sheep and cattle, and in districts where frost is not too severe, will, with careful management in feeding off and proper cultivation, give many crops, and last for several years. Silver Beet can be successfully grown in most parts of Victoria.

SOIL.—Silver Beet requires a good deep loamy soil, which has been well cultivated and quite free from weeds. The most suitable manure is a mixture of Bone-dust and Superphosphate, applied at the rate of about 2 or 3 cwt. to the acre. A good seed bed is essential to success, and the ground must be properly prepared prior to sowing the seed.



A Good Crop of Brunning's Silver Beet.

SEED SOWING.—Before sowing, the seed must be steeped in cold clean water for 20 hours, otherwise it is liable to hang in the soil and rot. In very mild districts, seed can be sown either in the Autumn or Spring. Spring seeding, when there is warmth in the ground, gives the best results, and sowing should not be carried out until the soil is warm. The best time is from about the end of September to the end of October. Seed sown early in October will be ready to feed off about the end of the following February, and when well grown, will give six feedings within the succeeding 12 months. Sow the seed in drills 24 to 27 inches apart, allowing about $\frac{1}{4}$ inch between each seed, and sowing about a $\frac{1}{4}$ inch deep. From 4 to 5 lbs. of good seed is sufficient to sow an acre. It is desirable to sow Silver Beet on the flat to prevent stock from eating the plants down too closely. This is always a danger with plants sown in raised rows, as there is a risk of the lower portions of the plant being exposed and eaten.

VARIETIES.—There are a number of varieties of Silver Beet, most of which are principally suited to the Vegetable Garden. The most successful varieties for sheep and cattle pasture are Brunning's "Delicious," which has a large, plain dark green leaf with wide, broad stems and a thick white mid-rib, and "Lucullus," which is very similar to "Delicious," except that the leaves are very handsomely curled. These two varieties are of about equal value for fodder.

SILVER BEET IS AN EXCELLENT FODDER FOR SHEEP

SILVER BEET. (Continued.)

SUBSEQUENT TREATMENT.—When about 4 inches high, thin out to about 3 to 4 inches apart, a week later thin out again, and when the plants are about 8 inches high and growing strongly, finally thin out to about 15 inches apart in the rows. These remaining plants constitute the permanent crop. The plants pulled at the final thinning can be cooked like Spinach and eaten, and used in this way are a splendid addition to the menu. As the plants grow, inter-cultivation is necessary, for it is not the value of the first year's crop that determines the economical importance of Silver Beet, but rather the many successive crops, which well-nourished plants, carefully managed, afford at subsequent seasons of the year.

Feed the crop off immediately the outer leaves show an indication of taking on a yellow tinge, and **HERE CARE IS NECESSARY.** The procedure in feeding off depends on the number of sheep to be fed. In the first place, the Beet should be fed off in from seven to nine days, or in a shorter period, if possible. This is necessary for the reason that the plant shoots away very rapidly after being eaten down, and should stock remain even a day too long, they are liable to eat the young growing shoots which form the second growth and thus destroy same.

Assuming that the first feeding has been obtained in March, the second feeding should take place in June. Silver Beet will continue to grow through the Winter, and in the Spring provide its best and most abundant fodder. Thence onward, properly managed, the crop will give several feedings extending through to the early Winter.

Do not allow too long a period between feedings, otherwise the plants may throw out seed stalks, with the result that their feeding value for subsequent growths will be impaired.

Silver Beet needs careful management, and the area grown must not be more than can be effectively controlled, and fed off at the right periods. It is only when Silver Beet is managed to the best advantage that its great value as a forage crop is realised.

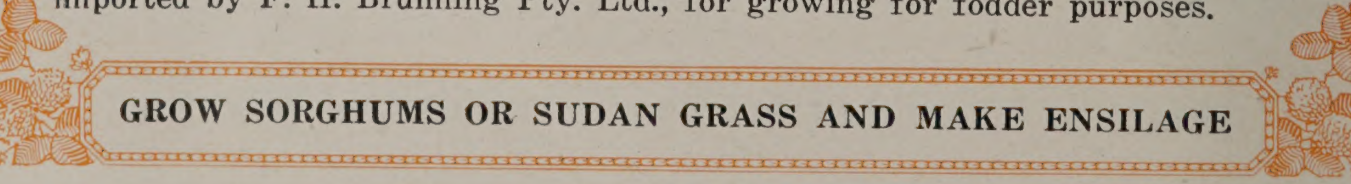
THOUSAND-HEADED KALE

(*Brassica oleracea acephala*.)

Thousand-headed Kale is a very useful forage crop, yielding a large amount of nutritious feed valuable for milch cows, as it increases the milk yield. All dairy farmers should grow at least a small area of this most useful plant, providing the climatic conditions which are similar to those needed for Rape are congenial. Thousand-headed Kale is also excellent for fattening cattle, pigs and horses, and having a wide range of usefulness, and doing well throughout Southern Victoria is worthy of close attention; it is quite unsuitable for hot, dry districts even where irrigation or ample rainfall is available.

SOIL PREPARATION AND SEED SOWING.—Prepare the ground as recommended for Rape (see page 8), and sow the seed in drills from 30 to 36 inches apart. When about 3 inches high, the seedlings are thinned out to 30 inches apart in the rows. Seed may be sown in January and February, and again in May and June, using from 2 to 3 lbs. of seed per acre.

SUBSEQUENT TREATMENT.—When the seedlings are a few inches high, scarify the ground between the rows, and subsequently cultivate occasionally to keep down the weeds until the plants begin to touch each other in the rows; they will then smother any weeds that may spring up. Thousand-headed Kale is valuable for fodder inasmuch as it does not cause sheep or lambs to blow or scour. It is a heavy yielder and can be cut several times, as after each cutting the plants will sprout immediately, giving another good yield in a few months. The variety recommended is **Russell's true strain**, specially imported by F. H. Brunning Pty. Ltd., for growing for fodder purposes.



GROW SORGHUMS OR SUDAN GRASS AND MAKE ENSILAGE

SECTION 3

ANNUAL SUMMER FODDER CROPS

SORGHUMS

(*Andropogon Sorghum*.)

The varieties, principally grown in Victoria, are Early Ambercane, *Sorghum Saccharatum*, Imphee or Planter's Friend, Saccaline, Sudan Grass, and Broom Corn or Broom Millet. All of these varieties are suitable for fodder purposes, with the exception of Broom Corn, which is principally grown for its valuable broom straw, and except for ensilage, is really much inferior to the other sorts for forage. (Sudan Grass has now become one of the leading annual Summer pasture and hay grasses of this State, and is dealt with separately on page 32.) Plants of the *Sorghum* family have a vigorous root system, which enables them to exploit a considerable area of ground, and utilise to the fullest extent its inherent fertility.

VARIETIES.—Early Ambercane is suitable either for pasturing or for ensilage, and is one of the sweetest varieties. Coming in very early, it usually yields three cuttings in a season. The sugar contents of Ambercane make it very fattening, and bullocks can be brought to prime condition on it, but when fed before maturity it is liable to blow stock badly, and therefore should not be used too early.

Sorghum Saccharatum is a black-seeded variety, and most valuable for green feed, although it makes good hay and silage. It is especially useful for dairy cows on account of its milk-producing qualities.

Imphee or Planter's Friend and Saccaline are both valuable for late districts, on account of their hardy qualities, and both varieties can be sown as late as January. These hardier Sorghums are well suited to Gippsland and other localities, near the sea coast. The seed of both is nearly always of a brownish colour, the outer covering not being retained as with Early Ambercane and *Sorghum Saccharatum*. Saccaline is an improved variety of the sweet Sorghum, and is the latest introduction of this family. Its special characteristics are its habit of ratooning or stooling out, which takes place after each cut, thus giving a number of good cuttings in a single season, and its sweetness and palatability. Very heavy yields of Saccaline have been recorded, and its growth during warm weather is so rapid that it is especially valuable for cleaning up old *Paspalum* pastures. This *Sorghum Saccaline* is a new introduction, first offered commercially in 1918, and must not be confused with the "Saccaline" (*Polygonum Sacchaliense*) discarded many years ago as worthless.

Broom Corn or Broom Millet has a very high economic value on account of the utility of the broom straw for manufacturing purposes. For fodder purposes, harvest the crop before it is thoroughly ripe and utilise the stalks for ensilage. For this purpose it is more easily harvested than Maize, to which it is quite equal on analysis, and can be handled better for the chaff-cutter. The seed may be used for poultry feed and for pigs. Good Broom Corn will always pay as there is a regular market for the fibre, and the crop can be grown with very little expense for machinery.

Included also in the *Sorghum* family is Johnson Grass, which is distinguished from the other varieties by being a perennial as well as by its aggressive underground root stocks, which in many localities cause it to become a pest. When thoroughly established in warm districts, Johnson Grass is very difficult to eradicate, and should only be planted where it is not likely to become a troublesome weed. This plant is also known under the name of

SORGHUMS. (Continued.)

Aleppo Grass, Racecourse Grass and Evergreen Millet. The seed of Johnson Grass does not possess a high germination, from 60 to 65 per cent. growth being considered good. It thrives well in all soils and situations, and if intended to be fed to stock should only be cut while tender. Pigs are extremely fond of the root stocks which are often fed to them in the same manner as Artichoke tubers. About 12 lbs. of Johnson Grass seed is required to sow an acre. The green fodder possesses a higher percentage of poison than the other Sorghums, and must be well wilted before being fed to stock.

Other annual members of the Sorghum family include **Dhaura or Egyptian Corn, Jerusalem Corn, Feterita, Shallu, Milo Maize and Kaffir Corn.** These varieties are not very extensively grown in Victoria, being much better suited to warmer climates, such as Queensland where Feterita, Milo Maize and Kaffir Corn in particular are grown on a fairly extensive scale.

UTILITY.—With the exception of the perennial variety Johnson Grass, the Sorghums previously mentioned are all annuals, and are grown for Summer or Autumn fodder. They may be pastured, cut and fed green, cut and made into hay, utilised for ensilage, and the last growth may be saved for a seed crop. It will thus be seen that Sorghums have a very wide range of utility. The plants have no value for ploughing under for green manure, and where possible it is advisable to burn off the stubble and plough the ashes under. As a pasture plant, Sorghums are valuable for fattening sheep and cattle for market, for dairy cows (their milk-producing qualities are undoubted), as well as for horses and pigs. In the coastal districts of New South Wales, Sorghums as pasture plants are very popular with the dairy and pig farmer, and many thousands or acres are planted there annually.

Sorghums are also valuable for cutting for green feed (see note on page 16 re allowing to wilt), they make splendid ensilage, and when sown thickly broadcast, make the finest quality hay. In this particular respect, Sudan Grass is unexcelled, and ranks as one of the leading Summer Hay Grasses. In addition, the last growth can be allowed to mature and a seed crop secured. Imphee and Saccaline are not suitable for growing for hay, and are most advantageously utilised as pasture plants, or cut and fed green or made into ensilage.

The chief advantage of the Sorghums lie in the heavy yield, their drought and bad weather resisting qualities, and the fact that the crop can be used over a fairly long period. These special qualities apply equally to Sudan Grass (see page 33).

SOIL PREPARATION.—To obtain the best results, thorough soil preparation is necessary, and the ground must be in good condition. A well-prepared, firm seed bed is essential, and as Sorghum seedlings only grow slowly at first, particularly if the weather is cool, the ground must be kept free from weeds. New ground or old stubble land will require to be ploughed, but fallow ground will only need to be disked or scarified. Where fertiliser is necessary, Superphosphate is the most suitable, but as Sorghums are liable to exhaust the ground, in view of the succeeding crop, it is advisable to use Bonedust and Superphosphate mixed. From 150 to 200 lbs. of fertiliser per acre is not too much on ordinary quality land, while a much lesser quantity will be ample on rich soil. Sorghums appear to have no marked preference for any particular kind of soil except that it must be well drained.

SOWING THE SEED.—Seed of the Sorghums may be sown from September to January, the period being limited by the season only. Time must be allowed for plants to mature before frosts set in, although Saccaline and Imphee, which are much hardier than the other varieties, and thus suitable for late sowings, may in some districts be seeded up to the middle of February. In fact, Saccaline will in many cases stand right through the Winter, and give a cutting in the Spring.

The quantity of seed per acre varies according to the available moisture. When sowing for hay, broadcast at the rate of 12 lbs. per acre for dry districts, but where irrigation is available, and in regions with a good regular

FODDER CROPS FOR AUSTRALIA

SORGHUMS. (Continued.)

Summer rainfall, from 20 to 25 lbs. of seed per acre is often sown, this heavier seeding producing much finer quality hay, and well repaying the extra outlay. Thick seeding produces finer stems, and a larger proportion of leaves, and even when sowing in drills where plenty of moisture is available, thick seeding is desirable, as the plants are not liable to grow so coarse. Thick seeding is also advisable for ensilage, but everything depends on the land and moisture conditions. If the plants grow thickly, the stalks will not be so heavy, and this makes better ensilage than the very thick stems. In very dry districts where irrigation is not available, sow in drills from 24 to 36 inches apart, in which case from 6 to 8 lbs. of seed will be required per acre, and under such conditions, thin seedings combined with frequent cultivation give the best results, although the yield is somewhat less and the plants coarser.

As Imphee and Saccaline are not usually grown for hay, the best results from these two varieties will be secured by drilling the seed in rows, 36 inches apart each way and cultivating frequently.



A Fine Crop of Ambercane.

SUBSEQUENT TREATMENT.—Where broadcasted, Sorghums require no after cultivation, but when sown in drills, frequent cultivation must be practised, to keep down the weeds and to conserve the soil moisture. Where irrigation is available, cultivate as soon after applying the water as the soil is workable, and where the rainfall must be relied on, as soon after rain as the state of the ground permits; should a long dry spell set in, continue to cultivate. Do not irrigate after the flowering stage, as too much water given Sorghums at that period seems to encourage Aphis, and this is particularly so with Early Ambercane and Sorghum Saccharatum. Two, three, and sometimes four cuttings can be obtained in a season from Sorghums, new shoots developing from the stubble. For a better second crop, it is advisable to cultivate the rows or broadcast stubble after the first cutting has been removed. The yields vary, but up to 50 tons of green feed per acre is no exception, and a fair average crop will run from 30 to 40 tons of green fodder per acre, which, when made into hay, will be reduced by at least 75 per cent.

IMPHEE AND SACCALINE ARE LATE SORGHUMS

SORGHUMS. (Continued.)

PASTURING SORGHUMS.—The only safe time for feeding off Sorghums is at the full flowering stage, and after the earliest seed head has shot. From this stage onward, the plants can be kept grazed until killed out by frost in June or July. It is inadvisable to graze Sorghum in the earlier stages of growth, as there is always the danger of stock being poisoned. It is only in an emergency where feed is very scarce that the risk should be taken, and even then the stock must first be fed with some Lucerne hay so that they are not turned in on the Sorghum with empty stomachs, i.e., ravenously hungry. This precaution is also very necessary to prevent "bloat," and especially so after dry feeding, where the stock have not just come from some other green pasture. (See also notes on Sorghum Poisoning.)

FOR GREEN FEED, HAY, OR ENSILAGE.—The best time to cut either for green feed, hay or ensilage is when the seed head has formed, but while the seed is still soft, and in the milk stage and before maturity. At this stage the greatest yield is obtained, and the food is in the most palatable and digestible condition. When cutting for seed, do not allow the plants to stand too long, as the seed is apt to shatter and a large quantity is thereby lost. Sorghums may also be cut for green feed when about 2 feet high. See page 18 for the methods carried out very successfully by Mr. R. B. Roberts, Horsham.

SORGHUM POISONING.—For many years, it has been recognised that Sorghums pastured before the flowering stage, especially when stunted by drought or frost, are at time poisonous to stock, and this has led to many farmers refusing to plant this most useful family of annual Summer Fodder plants.

The danger of poisoning from the Sorghums (with the exception of Johnson Grass) has been considerably over-estimated, as the death rate among live stock from this source is low compared with other causes, and providing reasonable care is taken, and proper methods of feeding off are employed, any possible loss in this manner may be reduced to nil.

When cut to be fed before flowering, Sorghums must be allowed to wilt in the sun for several hours before being given to stock, as at this stage it contains a large proportion of Prussic Acid, and is liable to be poisonous. This poisoning quality, however, disappears when the flowering stage has been reached and the seed head has shot.

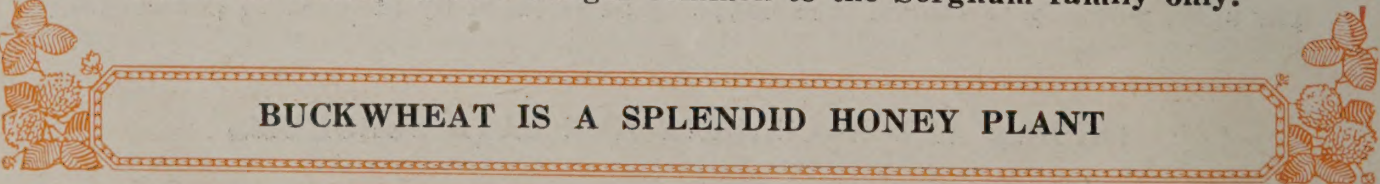
The poison is more pronounced in the earlier stages of the second growth of Sorghums, and especially when, owing to a period of drought, the growth has been stunted.

In the form of properly prepared silage or dried fodder, Sorghums are never poisonous. When pastured, Sorghums are liable to be injurious to stock in three ways:—

1. By causing "bloat," like any other green fodder. This, however, can be prevented by giving the beasts some Lucerne hay to partially appease their hunger before turning in on the Sorghum, and by penning on small areas at a time. It is always inadvisable to turn ravenously hungry stock, especially milking cows, in on Sorghum, or for that matter, on any green fodder.

2. By poisoning, in the stages of growth before flowering, or as previously stated when the growth has been stunted by frost, drought or other injury to the plant. Sorghum then seems to contain a much larger proportion of Prussic Acid, but on recovering growth and being cut and dried before being fed, the poisonous element, which is very volatile, appears to be eliminated.

3. By impaction, but this only occurs in very isolated cases, and cannot be looked on as a danger common to the Sorghum family only.



BUCKWHEAT IS A SPLENDID HONEY PLANT

FODDER CROPS FOR AUSTRALIA

SORGHUM POISONING. (Continued.)

Should the crop look at all suspicious, try a beast or two of inferior value on it, and if it refuses to eat, it is probable the plants are not safe, but if unaffected after a few minutes feeding, let the flock follow. Hungry stock are, of course, more liable to be poisoned than those given some feed prior to being turned in on the field.

The various members of the Sorghum family are particularly valuable for grazing, and provided the plants are growing steadily, are not stunted and dormant, and have reached the flowering stage, are quite harmless. Stock must not be run in on pastures in a ravenously hungry condition. The best method in such a case (where absolutely necessary) is to drive them in at one end of the Sorghum paddock allowing about an hour on the pasture, during which time the animals will have secured a fair allowance of feed, and keeping them quietly on the move all the while, or, as one grower describes it, "Driving them through slowly."



The experiences of some successful practical growers of Sorghums in connection with the pasturing of the crop and Sorghum poisoning will be of interest.

Mr. J. McDonald, Mead (26/5/21), who has grown Sorghums for over 40 years, states:—

"I have never had a single beast affected with Sorghum poisoning, although I have known my neighbours to lose quite a lot through this cause. I never pasture until the earliest seed head has shot, and then I keep the fields grazed until killed out by frost. It is inadvisable to graze Sorghum in the very early stages unless feed is extremely short, and then only in an emergency, as apart from the danger of poisoning, a considerable amount of the value of the crop is lost by feeding off too young.

"The worst danger to stock is when put in on Sorghum very hungry, as they are then liable to both 'bloat' and poisoning, and where it necessary to adopt this course I would suggest feeding the stock with some Lucerne hay before turning in on the field.

"As mentioned previously, I have never had a single beast affected, but I have noticed with my neighbours that milking cows seem to suffer the most, especially if turned in suddenly on a Sorghum paddock when very hungry. In such a case, I have known two out of every three to be dead within an hour."

Mr. A. Glass, of Messrs. Glass Bros., Nanneella (1/6/21) says:—

"I would on no account use Sorghums for grazing until the seed head had shot, but I have pastured stock on Sudan Grass in all stages of growth for the last four years, and during that time, have never lost a beast, sheep, cattle or horse."

INCREASED PRODUCTIVITY PAYS. SEE PAGES 119 TO 123

SORGHUM POISONING. (Continued.)

Mr. R. B. Roberts, Riversdale, Horsham (29/5/21) writes:—

"I certainly do not consider it safe to pasture any stock on Sorghums in the early stages of growth under any circumstances whatsoever. I make the first cutting when the plants are about 2 feet high, and wilt the Sorghum about 12 hours before feeding. I made four cuttings in this manner from mine this past season, and took the fifth after the Sorghum was ripe, and I had got what seed there was. I then turned the stock in."

Messrs. P. Spowart & Son, Mincha West (30/5/21) state:—

"With reference to Sorghum, our plan was always to feed it off when it was well out in seed head, and we never had any trouble with poisoning. Our next-door neighbour had 50 cows on his Sorghum when it was about one foot high. It was well-grown, healthy, vigorous fodder, and gave no ill-effects, and we have known of other cases where cattle have been pastured on Sorghum in its early growth without ill-effects. We also know of cases where the cattle have broken into the field with fatal results.

"Our opinion is that it is safe to pasture cattle, sheep or horses on it at any time provided it has not been stunted. In the case of cattle, if they have not had any previous green grass, it would be as well at first to give them only a few minutes on Sorghum, gradually increasing the time for a few days, otherwise they are liable to gorge themselves."

Mr. T. Ross, Northwood, via Seymour (30/5/21) in this respect, writes:—

"I have had cattle on before the seed head has shot, with the morning dew on the plants, and have never lost any beast, but I consider it all depends on what pastures the cattle are on before being put on the Sorghum. The safest way to feed to any stock is to cut the Sorghum and allow it to dry for half a day before giving it to the animals."

Messrs. John McKay & Co., Leitchville, writing 8/6/21, remark:—

"We have never heard of stock being poisoned through eating Sudan Grass, but Sorghum poisoning is quite a common occurrence.

"The danger period being in most, if not all cases, when the crop is upwards of about a foot in height, and wilting for want of water, but even then if a little care is exercised, only letting the stock on for short periods until they become accustomed to it, and driving them afterwards till the gasses have been worked off by the exercise, the trouble is considerably minimised.

"The above is only the result of our own experience and enquiries from other people, and we trust will be of some use to yourselves."

These experiences have been selected from a number received from practical growers throughout the State, as they represent widely apart districts wherein Sorghums are grown. Referring to the remarks from Messrs. P. Spowart & Son, it is quite true that **IN SOME CASES**, when being grazed on Sorghums, cattle will escape the poisonous action at any stage, but the risk is always there, and the practice cannot be commended.

The reason why Sorghum is only sometimes poisonous is due to the fact that two principles are required to produce the poison. **THE GLUCOSIDE** itself and **THE FERMENT** which acts on the glucoside and converts it into the poisonous element (**PRUSSIC ACID**). Sometimes the glucoside and not the ferment is present in the plant, and sometimes both. In other cases, the ferment is either present or absent in the animal's stomach, and this appears to be why some animals are quickly poisoned, while others appear to be quite immune.

Johnson Grass appears to contain a much larger proportion of Prussic Acid than the other varieties of Sorghum, while the genuine "GARAWI" Sudan Grass is regarded as being practically free. It is, however, always advisable to take precautions, as by exercising reasonable care and ordinary precaution there will never be any loss of stock through poison by any of the annual Sorghums or "Garawi" Sudan Grass.

As a rule, young Sorghum is poisonous, especially in the second growth, but finely chaffed Sorghum at any stage is safe, as the Prussic Acid is very volatile; while at the flowering stage, or as soon as the seed head has shot, Sorghum can be utilised in any manner.

The poisoning element in Sorghums, Prussic Acid, is the same as Hydrocyanic Acid. The latter name is often used by writers, but the actual poison is the same.

THE CONSERVATION OF SOIL MOISTURE

THE NECESSITY OF HUMUS IN THE GROUND AND THE IMPORTANCE OF CULTIVATION.

The whole secret of the conservation of moisture in the soil may be clearly represented by taking a cube of ordinary loaf sugar and placing on top of it a heap of powdered sugar about a quarter of an inch deep. The solid sugar represents the soil and the powdered sugar the "soil mulch," which is obtained by harrowing, disking, or cultivating the ground.

Take a glass with a concave bottom, and dilute in water a few drops of writing ink, and place the cube of sugar in the fluid. You will notice how quickly the dark solution rises, and in a few seconds it has reached the top of the solid sugar, but there it stops. The "powdered sugar mulch" does not take up the liquid in the same way as the solid lump of sugar, and if you let the experiment stand, you will find that it would take an hour or more for the dark liquid to soak through the powdered sugar. This simple test clearly demonstrates the whole secret of the conservation of soil moisture. By disking and harrowing, or to be brief, "cultivating" the soil to form a fine mulch, this powdered soil or surface mulch will act just like the powdered sugar.

Soil ordinarily contains many passage-ways through which water quickly rises to the surface by what is termed "Capillary attraction," and this power of drawing up water from the lower strata towards the surface is one of the greatest importance from the Agriculturist's point of view. It is possessed, in a greater or lesser degree by all soils being greater in proportion as the pores are finer. Sand possesses this power to the least extent, and clay to the greatest, thus a clayey soil is always wetter than sandy ground placed under the same influences.

When the surface soil is left undisturbed, unless the mulch covering is provided by disking, harrowing or cultivating the ground to prevent the water rising quickly to the surface, the moisture will evaporate and the soil will bake, break and become hard, dry and unproductive. The importance of conserving moisture will be realised when it is understood that experiments have determined that it requires approximately 300 tons of water to grow an average acre of corn, and this total does not take into account the water that is being constantly evaporated from the soil in which the crop is growing. The 300 tons represents only the moisture actually used by the plants themselves.

The water holding capacity of any soil depends on its composition and texture; the lighter a soil, or the more sand it contains, the lesser water it will hold. The more humus a soil contains, the greater its water holding capacity, for humus is a vegetable sponge. The "Conservation of Soil Moisture" therefore depends on two factors, each of which are equally important.

1. Thorough cultivation to preserve the "surface mulch."
2. A good supply of humus in the ground.

Humus is necessary to take up the moisture and keep it from seeping into the lower levels beyond the reach of the plants, and from running off the surface.

THE CLIMATIC CONDITIONS OF SO MANY PARTS OF AUSTRALIA DEMAND THE MOST THOROUGH AND CAREFUL CONSERVATION OF SOIL MOISTURE that the Agriculturist who learns to store moisture in his soil and to keep it there for the use of crops when they most need it, has solved one of the most important problems of crop production.

COW PEA

(*Dolichos Sinensis*.)

The Cow Pea is in reality a bean, and one that was largely cultivated for food in the Old World several centuries ago. The Cow Pea grows throughout the Summer, and is one of the most useful annual leguminous Summer fodders suitable for the warmer parts of this State.

CLIMATIC CONDITIONS.—Somewhat similar climatic conditions to those required for Sudan Grass or Maize, are suitable to its cultivation. But as some heat is necessary, while these plants can be successfully grown in Gippsland and the Western District of Victoria, it would be advisable to restrict Cow Peas to the Northern and North-Western parts of this State. As a drought-resistant plant, Cow Peas are nearly equal to Sudan Grass, and much superior to Maize.

UTILITY.—Cow Peas are valuable for forage purposes, and as a soil restorer. In addition, the seed of the White variety is commonly used for human consumption in America, similarly to the Haricot bean. Both for their absorbent nitrogen qualities and for green manuring purposes, Cow Peas are valuable for growing in an orchard as a Summer crop, and will withstand moderate shade, but where grown in intense shade, are liable to mildew.

Quite apart from the orchard, Cow Peas can be successfully grown on all types of arable soil as a short Summer fodder crop requiring little attention, as the broad leaves will smother the weeds.

At the same time, Cow Peas produce most excellent forage, either for hay or pasture, and are in addition a splendid soil-improving crop, being extremely valuable for ploughing under for green manure and sometimes are grown solely for this purpose; like all leguminous plants they add nitrogen to the soil and thus help to restore its fertility.

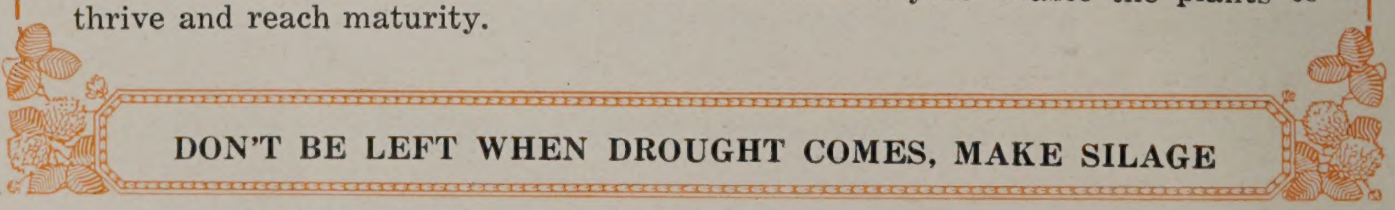
VARIETIES.—The principal sorts are Whip-Poor-Will, Clay-Coloured, Black, and Black-Eyed-Susan, all of which are of about equal value. There are, however, actually in commerce twenty or more distinct sorts of varying merit.

SOIL.—The plant is not exacting as regards soil conditions, but the ground must be thoroughly drained, and proper soil preparation similar to that required for Maize is necessary to obtain the maximum results. Where possible, it is advisable to fallow the ground in the Autumn, then to plough in the Spring, harrow, disk and roll.

SEED SOWING.—The first week in October is early enough for seeding Cow Peas, as if sown before the soil is well warmed, the seed is likely to lie in the ground and rot, and even where early sown seed does germinate, the young plants are liable to be destroyed by frost should there be a late spell of cold weather. Seeding may be continued up till about the end of November, or even later in districts with a lengthy Summer.

Seed may be broadcasted, from 90 to 120 lbs. being required per acre, but the most economical way is to sow with an ordinary grain drill in rows 3 ft. apart each way, when from 15 to 20 lbs. of seed will suffice. If the drills are set closer, the amount of seed sown per acre will be increased correspondingly.

Being a drought-resisting plant grown in the Summer, it will naturally be understood that the best yields both of hay and seed will be obtained by sowing in drills and cultivating several times while the crop is growing in order to retain in the soil the moisture so necessary to enable the plants to thrive and reach maturity.



DON'T BE LEFT WHEN DROUGHT COMES, MAKE SILAGE

FODDER CROPS FOR AUSTRALIA

COW PEA. (Continued.)

GENERAL TREATMENT.—Frequent cultivation to conserve the soil moisture and to keep down the weeds is the only treatment necessary, but this is only possible when the plants are grown in rows.

The Cow Pea is an indeterminate plant, and keeps growing on until killed by frost, producing green pods as long as the plants live.

"WAS A HUGE SUCCESS."

"Tooram,"

NTH. BEACONSFIELD.

4th April, 1921.

Messrs. F. H. Brunning Pty.
Ltd., MELBOURNE.

Dear Sirs,

The "GARAWI" Sudan Grass was a huge success, first cutting for cows green feed between 5 and 6 weeks from time of planting early in December.

(Sgd.) H. MURRAY GIBBES.

KEEP THE SOIL FERTILE. HOW?

1. Raise live stock.
2. Rotate the crops.
3. Add humus. Don't burn the stalks.
4. Grow Cow Peas, Sweet Clover, Berseem, and other leguminous crops.
5. Save the stable yard manure.
6. Pasture rolling lands to prevent washing.
7. Supply the needed elements.

"GREW 9 FEET HIGH."

Renmark Dairy,
RENMARK, S.A.

10th February, 1921.

Messrs. F. H. Brunning Pty.
Ltd., MELBOURNE.

Dear Sirs,

I got "GARAWI" Sudan Grass seed through Mr. R. N. Saies from your people last year, and it grew 9 feet high. Of course, it had two waterings.

(Sgd.) R. H. WHELLIM.



A Plant of Black Cow Pea.

Its hay value is good, but it is often difficult to cure. Ploughed under for green manure, Cow Peas are particularly useful, especially as during the period of growth, the thick stems will smother the weeds and thus keep the ground clean. The best time for ploughing under for green manure is when the first pods are thoroughly ripe.

A SILO IS AN INSURANCE AGAINST DROUGHT

COW PEA. (Continued.)

GROWING FOR HAY.—When being grown for hay, do not cut the crop before the first pods are ripe, and, if desired, cutting can even be delayed until later. Where planted even in 3 feet check rows, the plants support each other so that they can be cut with an ordinary mower, to which it is desirable to add a bunching attachment. Whip-Poor-Will is a rather bunching variety, and can be handled more easily than the vining sorts, Clay-Coloured and Black-Seeded. The plants have succulent leaves and thick stems, and are not easily cured except in very favorable weather.

In hay-making, some kind of a support should be given to the stooks, as this aids very greatly in the final stages of curing. Be careful not to permit the leaves to become too dry in the swarth before raking into the windrows as loss of foliage may thereby result, and do not make the stooks too large as the moist stems are liable to cause mildew, especially of the pods. Should the hay be wetted by rain at any stage of the curing, do not handle again until the surface has dried well.

IN MIXTURES.—Cow Peas, being an annual Summer growing legume, are valuable for sowing in mixtures with Maize, Sudan Grass, and other Sorghums. When grown with either Sudan Grass or the Sorghums, from 20 to 30 lbs. of Cow Peas, and from 2 to 3 lbs. of Sudan Grass or Sorghum seed will be required to sow an acre in drills 3 feet apart each way.

Sown in between the rows of Maize or close to the plants, the vines of the Cow Peas climb up the Maize stalks and add considerably to the herbage; Maize and Cow Peas make a splendid mixture for ensilage, adding materially to its value. The Cow Peas are not sown with the Maize, but after the first cultivation, at the rate of 45 lbs. to the acre. (See illustration on page 26.)

CATTLE PUMPKIN

(*Cucurbita maxima.*)

The Cattle Pumpkin forms a useful article of diet for cattle and pigs during the Winter and Spring, and the term "Annual Summer Fodder" actually refers to its growing season. Cattle Pumpkins may be stored for several months and used as required.

SOIL REQUIREMENTS AND PREPARATION.—The Cattle Pumpkin requires a deep, rich, friable loam, but good crops may be obtained on all deep soils, providing they are well enriched with manure. Plough deeply, and use the subsoiler to thoroughly open up the ground, so as to allow the roots to penetrate well into the soil. After the land has been prepared, make low mounds or "hills" of rich soil 12 feet apart each way, leaving these slightly convex on the top.

TIME AND METHOD OF SOWING AND CULTIVATION.—About end of September or early October, sow 4 seeds (an equal distance apart) on each hill, and when the seedlings are through and growing well, pull out the weakest, leaving only two plants to produce the fruit. From 1½ to 2 lbs. of seed will be required to plant an acre. The only cultivation necessary is an occasional scarifying to keep down the weeds between the "hills" while the plants are young, and beyond this they require no further attention, as when the plants are growing strongly, the broad leaves will smother the weeds.

HARVESTING.—When the fruit is mature, gather the Pumpkins and store in a dry place, where the air can thoroughly circulate; in this way they will keep in excellent condition for months. Before being fed to stock, cut the Pumpkins into slices.

VARIETIES.—The best sorts of Cattle Pumpkins are—Ironbark, Mammoth, King of the Mammoths, Turkscap, Gramma, Crown and Large Button; some of these varieties can also be used for the table. Brunning's Pumpkin seed is specially grown under contract each year, to keep the strains, which are all improvements on the original introductions, true and pure.

PEANUT

(*Arachis hypogaea*.)

The Peanut is a trailing annual, growing from 1 to 2 ft. high, with thick, angular, pale green, hairy stems, and spreading branches, and possessing the peculiar habit of maturing its seed underground. Before flowering the plant assumes an upright habit, attaining a height of from 12 to 18 inches high, but after the blossom falls, the ovulary is pushed into the ground, where it develops its pods, containing 1 to 4, but usually 2 seeds. The plant is also known as Ground Nut, Earth Almond, Goobar and Pindar.

UTILIZATION.—The Peanut has a very wide range of utility. The herbage may be utilized for hay, or the whole crop pastured. Stock are very fond of it both green and as hay, while for pigs it is a crop of considerable importance, and, as both vines and nuts are eaten, is a very economical method of producing pork. The famous Smithfield hams are made from pigs fattened exclusively on Peanuts. Where grown for forage, the tops are sometimes cut and cured for hay, and pigs then run in on the field and fed on the roots. They are particularly fond of the nuts, and will turn the soil upside down in search of them.

The Peanut is, however, not very largely used for forage, and is primarily grown for human consumption; in addition to being used in the roasted stage, it is made into several food products, such as peanut butter, salted peanuts, and various kinds of peanut candy. Another valuable feature of the Peanut is the oil produced therefrom. Peanut oil is somewhat similar to the finer kinds of Olive oil, and when highly refined, is a valuable lubricant for delicate machinery, as it does not clog the bearings. Peanuts contain about 45 per cent. of oil, and 2½ tons of nuts are required to make a ton of oil.

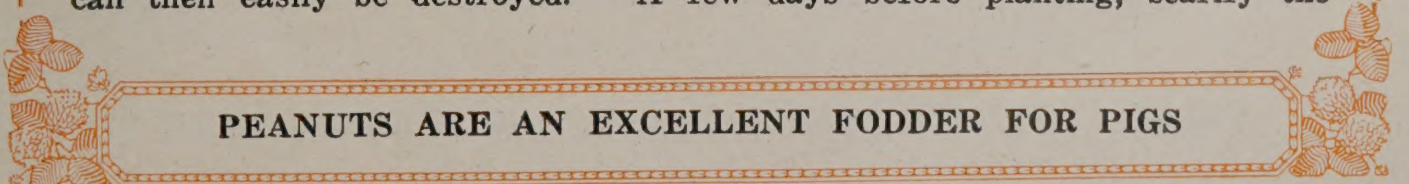
The Peanut is a splendid nitrogen gatherer, and would pay to grow as a soil improver, even if the nuts were never harvested. It stores nitrogen in the nodules on its roots, in the stems and in the leaves, and thus when ploughed under for green manure considerably improves the ground, but even when harvested for the nuts, is valuable in this respect, owing to its great nitrogen-gathering propensities.

CLIMATIC CONDITIONS.—When grown for the nuts, a climate with at least 5 months without frosts, a hot summer and a fair amount of moisture either from natural rainfall or by irrigation, together with fairly dry weather during the harvesting, is necessary, and under these circumstances, Peanuts are a very profitable crop, and having already been successfully grown in the Rochester and Bamawm districts, should provide a further lucrative proposition for those agriculturists throughout the Northern areas of Victoria, where irrigation facilities are available. As a green manure plant, Peanuts can be grown in most parts of Victoria.

SOIL AND ITS PREPARATION.—For green manure, the Peanut can be grown to advantage on both sandy and clayey soils, but where grown for the nuts, rich sandy loam or silty ground with an abundance of lime is essential. There must not be too large an amount of humus in the ground, although lime is necessary, and where lacking, must be applied at the rate of from 2 to 3 tons per acre.

Cleanse the ground thoroughly of all weeds, and plough with a light plough to a depth of not more than 6 inches, applying, where necessary, a dressing of stable manure, or failing that, Superphosphate, which is an excellent manure for the plant.

Break the ground up and leave the soil in a roughly ploughed condition for a few weeks prior to making the seed bed, as the sun and air have a beneficial effect upon it, and any weeds that may spring up in the meantime can then easily be destroyed. A few days before planting, scarify the



PEANUTS ARE AN EXCELLENT FODDER FOR PIGS

PEANUT. (Continued.)

ground, breaking it up very thoroughly, and bringing the soil to a fine tilth, which is necessary to allow the young pods to burrow in the ground to develop. A firm bed is necessary for the Peanuts to mature on, hence shallow soil preparation is essential, otherwise the stalks to which the embryo nuts are attached push deeply into the ground. When the nuts are ripened near the surface, harvesting is much simpler, and a much lesser quantity of nuts are lost.

TIME AND METHOD OF SEEDING.—New seed is essential, as Peanuts, like all other seeds containing a large percentage of oil, soon lose their germinating power. Carefully shell and hand pick all seed, keeping only the plump and perfect kernels with unbroken skins for sowing, so as to avoid a number of misses in the rows.

Seeding may be done by hand, or with a one-row planter, sowing in ridges 36 inches apart, allowing 18 inches in rows between the plants, and sowing to a depth of about 3 inches. From 28 to 30 lbs. of good seed will be required to sow an acre in this way. The middle of October, and in some districts even November is sufficiently early for seeding.

Seed may also be sown on the flat in rows the same distance apart, and the ridges made by earthing up as for potatoes.

CULTIVATION.—As soon as the plants appear, the ground between the rows must be regularly scarified to keep the soil loose and friable, until the pods appear, after which the ground must not be disturbed until harvesting. Thorough drainage is necessary, as if water is allowed to lodge between the ridges the nuts are liable to mildew and rot.

HARVESTING.—The crop is ready for harvesting when the greater portion of the nuts are matured and begin to turn brown, and this operation, for which fine weather is necessary, must then be proceeded with without delay. Where there is only a small area, the plants, when sufficiently dry, may be lifted with a fork, but where large crops are grown, a special plough that can be run deep enough to sever the tap root without disturbing the pods may be used. The vines can then be pulled by hand or lifted with a fork, allowed to dry slightly, and put in small stacks to cure, after which the nuts are lifted by hand or machinery, cleaned, sorted and stored in sacks ready for marketing. After the crop has been cleaned off the land, pigs may be turned on and will get a large amount of feed from the residue of the crop.

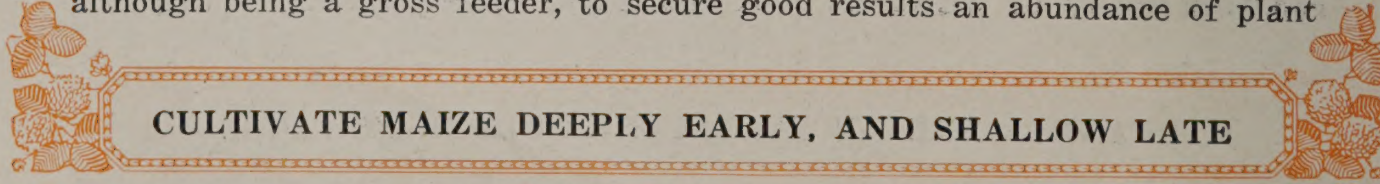
MAIZE

(Zea Mays).

Maize is too well known as a Summer feed and grain crop to need any further description. It is a crop that can be grown in practically all parts of Victoria for green feed, although in districts with a very short Summer season it would not be a profitable crop to grow for grain. Good returns of grain will be obtained in fairly cool localities, as will be gathered from the fact that the Mitchell River and Snowy River flats in the Bairnsdale and Orbost districts of Gippsland produce the heaviest yields and the finest quality Seed Maize in the world. Maize can also be successfully grown for grain in the Northern areas of Victoria, especially where irrigation facilities are available.

UTILITY.—Maize can be grown for green fodder and either pastured or cut and fed green, it makes silage especially valuable for dairy cows, and the grain is generally a payable proposition under reasonably suitable soil and climatic conditions. Apart from its use as a fodder for pigs and poultry, the grain has a high economic value, being utilized in the manufacture of glucose, while it forms the basis of Cornflour and Maizena.

SOIL REQUIREMENTS AND PREPARATION.—Maize is very adaptable as regards soil, and can be grown well on practically all classes of land, although being a gross feeder, to secure good results an abundance of plant



CULTIVATE MAIZE DEEPLY EARLY, AND SHALLOW LATE

FODDER CROPS FOR AUSTRALIA

MAIZE. (Continued.)

food is required in the soil. Deep river flats, such as the Snowy River flats at Orbost, give the maximum results, but soil of this description is limited, and in many districts it is essential to make the land up to the necessary fertility by the liberal application of natural manure or the use of a good artificial fertiliser (made up to a special analysis to suit Maize) at the rate of 112 to 224 lbs. to the acre.

The ground requires very thorough preparation, and to get the maximum yield, especially of grain, it is necessary to plow, harrow, roll, disk twice, and then roll again and harrow. After this last harrowing, another rolling should be given prior to planting.

In districts with a small Summer rainfall, where irrigation facilities are not available, Maize can be successfully grown by dry-farming methods. The land must be broken up in the Autumn and allowed to lie fallow, cultivating it thoroughly just prior to sowing the seed, and again immediately after the plants appear. Cultivation before seeding serves to catch and conserve the soil moisture which is so essential for the well being of this crop.



Cultivating Maize Six Weeks After Seeding.

WHEN AND HOW TO SOW THE SEED.—The time of sowing varies in different localities but under average conditions, seed may be sown both for grain and green feed from the middle of September to the end of October.

Although Maize will not stand frost, it is necessary to take a certain amount of risk in this direction, as when planting is delayed until too late in the season, the young seedlings may have to pass through a long dry Summer while their roots are still comparatively short and delicate, and before they are sufficiently established to be drought-resistant. Should a young crop be badly frost-bitten, the best plan is to scarify the paddock and re-sow immediately.

In some districts, Maize for green feed can be sown as late as the middle or end of January.

Seed is sown both broadcast and in drills, but drilling is preferable, as it shows a considerable saving in seed, and by permitting cultivation ensures a greater certainty of getting a heavier yield. When broadcasting, from $1\frac{1}{2}$ to 2 bushels for seed will be required per acre. When seeding in drills for green feed sow in rows 3 feet apart, dropping seed from 6 to 9 inches apart in the rows, but for grain, sow 3 feet apart each way, which will allow of cross-cultivation.

BRUNNING'S SELECTED MAIZE ENSURES BIG YIELDS

MAIZE. (Continued.)

The depth of planting varies with the time of sowing and the weather, remembering that the drier the soil, the deeper the planting, the earlier the sowing, the shallower. Never plant more than 3 inches deep.

When sown with a proper Maize planter, 14 lbs. of Brunning's Selected Seed Maize will be ample to sow an acre for grain seeding in 3 foot check rows; when growing for green feed or silage, dropping the seed from 6 to 9 inches apart in the rows, from 28 to 42 lbs. of seed will be required for the same area.

SUBSEQUENT TREATMENT.—Thorough and frequent cultivation plays a very important part in the successful growing of Maize and the disadvantage of broadcasting will be at once realised. Keep the soil between the rows well stirred with tooth harrows immediately after sowing, and when the young plants appear keep cultivating so as to destroy the weeds which will start away with the Maize. As soon as the rows show plainly, use the horse hoe and keep it working until the Maize is about 5 feet high, when it is too large to permit of further working. Frequent cultivation on the

above lines, even in dry districts will almost certainly result in a heavy crop. The old-fashioned idea of broadcasting 2 bushels of seed Maize per acre has now been quite superseded owing to the much greater and surer success from sowing in rows and cultivating frequently.

Remember that deep cultivation early in the season conserves the soil moisture, but that shallow cultivation late in the season saves the roots. Deep cultivation, when the plants are at all advanced in growth, is liable to damage or kill the roots. Early cultivation is very essential as the ground, if left for any length of time, will become full of weeds, which rob the land of moisture and plant food, while the soil is apt to become bogged by the late Spring rains and baked by the sun until it is hard, and out of condition.

The time to kill weeds is before they come up and before they have deprived the Maize of moisture and nourishment. This is especially important, as if Maize is stunted when young, either through a late frost, lack of soil moisture, or super-abundance of weeds, it will never recover even under most favorable conditions.

HARVESTING FOR SILAGE OR GREEN FEED.—The best time for cutting Maize for silage milky stage, and at this period the is when the grain is just past the heaviest weight of crop and the

greatest possible amount of nutriment is secured. To make the best class of silage, the material is chaffed or shredded, but where the necessary machinery is not available, good Maize silage can be made in the stack, although, under these circumstances, there is always a considerable waste on the outside. It is a good practice, especially in dry regions, to grow a



Maize and Cow Peas Growing Together.

GROW MAIZE. MAKE SILAGE. DEFY DROUGHT

FODDER CROPS FOR AUSTRALIA

MAIZE. (Continued.)

sufficient quantity of Maize which, when converted into silage, will be ample to last a dairy herd the whole year round. Ensilage from Maize is one of the best kinds of food for all classes of live stock.

HARVESTING FOR GRAIN.—When intended for grain, the cobs should be allowed to remain on the stalks till the middle or end of April. After picking, the cobs are stored in cribs or barns made with a framework of saplings, the walls being of wire netting; a rough flooring of slabs keeps the cobs off the damp ground, while the roof is made of bark, palings, or galvanised iron. The crib must not be more than 7ft. in width, so as to allow thorough ventilation, thereby aiding the complete drying of the cobs.

Shelling is done with a machine worked either by hand or horse power, and with a double spout machine up to 1,000 bushels a day can be done. Steam shellers are often largely used in certain districts, and with these machines from upwards of 2,000 bushels a day can be shelled.

SEED.—The cost of seeding Maize amounts to so little per acre than only the very best seed should be used at all times, and where possible every cob for seed should be topped, butted and graded before shelling. Some of the most suitable varieties for Victoria are:—

Early:—Ninety-Day, Longfellow, Early Yellow Dent.

Medium:—Cornplanter (White). Boone County Special (White), Improved Sib'ey, Craig Mitchell.

Main Crop:—Hickory King, James' Eclipse, James' Yellow Dent.

MAIZE IN MIXTURES.—After the last cultivation of Maize, Cow Peas are often sown in conjunction with same, and can then be ploughed under for green manure after the Maize has been harvested for either grain or silage. (See Cow Peas, page 22, also illustration on page 26.)

Messrs. F. H. Brunning Pty. Ltd.,
MELBOURNE.

Dear Sirs,

I have had splendid results with your "GARAWI" Sudan Grass this season.

"Woolaston Estate,"

WARRNAMBOOL.

27th January, 1921.

(Sgd.) ROBT. E. JAMES.

SUNFLOWER

(Helianthus annuus.)

The Sunflower is a native of Peru, and a plant of high economic value, owing to its many uses. Occupying the ground for only a few months of the year, it makes a most ornamental crop, the large yellow flowers and black seed heads presenting a most attractive appearance.

UTILIZATION.—Every part of the Sunflower plant can be used. The stalk contains a fibre from which paper is manufactured; the stems, when burned, contain a large proportion of potash (estimated as 60 lbs. of ash from 1,000 lbs. dried stems, yielding roughly about 35 per cent. of the best potash); when in bloom, they yield a large amount of honey and pollen, and a few plants for bees are worth growing each season by all apiarists; the seeds yield by pressure a fine quality oil, and the residue of the Sunflower cake makes good food for cattle or horses, while, in addition, the seeds, when roasted and ground, make a good substitute for coffee, and when made into flour without being roasted, can be made into a fine sweet, white bread.

VARIETIES.—Two varieties are mostly grown in Victoria, the Large Russian and the Black-seeded. The latter is regarded as the best for poultry feed, but is not so rich in oil as the Large Russian.

CLIMATIC REQUIREMENTS.—The Sunflower requires warm weather and a fair amount of moisture to obtain the maximum results, but being of very quick growth, and maturing in a very short period, there are few parts of Victoria where it cannot be handled successfully. At present it is prin-

MAIZE AND COW PEAS MAKE A SPLENDID SILAGE MIXTURE

SUNFLOWER. (Continued.)

cipally grown in the Bairnsdale and Orbost districts of Gippsland, but there is no reason why, with irrigation, it should not be a payable proposition in the North-Western, Northern and Goulburn Valley districts of this State.

SOIL REQUIREMENTS AND PREPARATION.—Being a gross feeder, to obtain best results, Sunflower must be grown on deep rich ground, but providing the soil is deep and judiciously manured, it can be cultivated successfully on poor land. For a good seed crop, the land must contain a large percentage of potash, and where deficient this must be applied to the soil in the shape of some fertiliser (such as Kainit), which is rich in this element.

It must be borne in mind that the Sunflower responds very readily to generous treatment in the way of fertiliser, providing it contains the special kind of food suited to the plant's requirements. Generally speaking, good Maize land is always suitable for the Sunflower, but the soil must be thoroughly and deeply ploughed and brought to a good tilth before the seed is sown. It is no use trying to grow Sunflower successfully on poor or badly worked soil.

TIME, METHOD, AND RATE OF SEEDING.—Seed may be sown from the beginning of September in the warmer parts of the State, but in the cooler districts, the first week in October will be quite early enough. The seed may be distributed by hand, or a corn planter with a special plate fitted for grain may be utilised. The best method is to plant in drills 3 ft. apart each way, thus allowing 3 ft. between the plants in the rows similar to Maize. It is advisable to sow two seeds together to provide against misses, covering lightly with fine soil, so that the young seedlings will have no difficulty in pushing their way through to the surface. From 8 to 10 lbs. of good seed is sufficient to sow an acre.

CULTIVATION.—In favorable weather, the seed germinates readily, and the young plants grow rapidly; as soon as they can be properly distinguished, scarify the ground between the rows to loosen the soil, and destroy any weeds that may have sprung up. The weeds between the plants can be kept down with a hand hoe, or when sown as recommended, in 3 ft. check rows, cross cultivation may be easily practised.

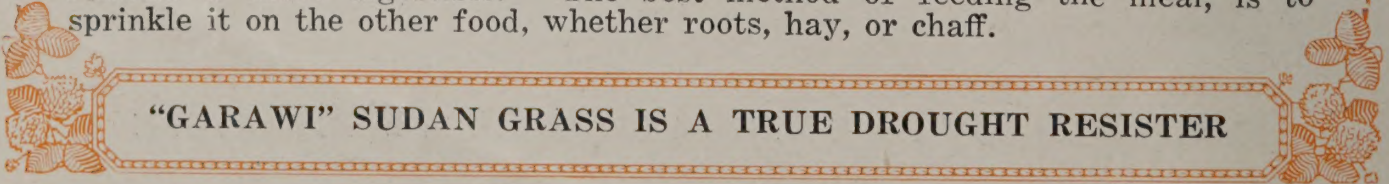
Repeat this cultivation frequently where necessary, until the plants are about 18 inches high, when they will smother any ordinary farm weeds that may spring up. The crop will then require no further attention until ready to be harvested, the precise time for which must be determined by the grower.

HARVESTING.—The plants attain maturity, and are ready for harvesting in from 4 to 5 months after seeding, according to climate. Do not allow the seed to become over-ripe before harvesting or a large percentage will be lost in the operation or blown about by the wind. Birds are very fond of the seed, and when it is ripe, are very destructive. Growers have solved this difficulty to a great extent by the use of the "Demon Bird Scarer," together with the occasional assistance of a man with a gun.

When the heads are quite ripened in the field, cut the stalks and cart to the barn, where the heads are removed by cutting, and laid out on a stone floor or some clean, hard surface, where the air can circulate freely about them. These heads must not lie too thickly, and will require turning over occasionally; protection from rain and heavy dews is also necessary. When sufficiently dry, the seeds may be removed by hand, a light flail, or some simple piece of shelling mechanism.

After threshing, clean the seed thoroughly by winnowing, and store in a cool, dry place until required. It is essential that Sunflower seed is thoroughly dry before being stored in bulk, otherwise it will not keep well, and is liable to become mouldy. The average return of seed is from 10 to 15 cwt. per acre, a ton being reckoned a really good yield.

FOR OIL CAKE.—To obtain oil from Sunflower seed, the grain is first decorticated, i.e., the husks are removed, otherwise the thick pithy lining of the husks will absorb a considerable proportion of the oil that would otherwise remain in the cake. This seed cake has a very high nutritive value as a fodder for cattle, but before being fed, must be ground into meal which renders it more digestible. The best method of feeding the meal, is to sprinkle it on the other food, whether roots, hay, or chaff.



"GARAWI" SUDAN GRASS IS A TRUE DROUGHT RESISTER

BUCKWHEAT

(*Fagopyrum esculentum*.)

Although never likely to attain great importance compared to the staple crops of this country such as Wheat, Maize, Oats, Barley, etc., Buckwheat is nevertheless a very useful plant, and one worthy of attention, on account of its wide sphere of utility.

UTILIZATION.—Buckwheat is generally the best grain crop for poor, thin land, and also does well on acid soils. Lime is largely taken up by the plant, but it does not require large supplies of this element in the soil, although fertiliser may be used to advantage, as it can make use of relatively insoluble materials to better advantage than the other grain crops. For this purpose it is especially valuable ploughed under in the late Summer for green manure. Buckwheat tends to make even very badly-drained land mellow and friable, and consequently it is a good crop to use in preparation for such crops as Potatoes.

Being particularly valuable for ploughing under for green manure, the ground benefits when grown for such a purpose as a Summer cover crop ploughed under in the late Summer or early Autumn. Buckwheat is suitable for sowing on new land, and ground just cleared of timber or drained marshy land containing much decaying vegetable matter will produce good yields of this grain.

As a weed destroyer, Buckwheat is particularly successful; it germinates quickly after being sown, and makes a rapid growth, and where the soil is not too poor, completely covers the ground. The heavy growth thus made will smother many weeds, but, of course, the land must be rich enough to produce a good growth when it will smother out such a pest as Quack Grass and at the same time produce a good crop of grain.

Buckwheat is therefore useful in two ways, firstly, saving the labor of working the land in the Summer to keep down weeds; and secondly, returning a crop of grain.

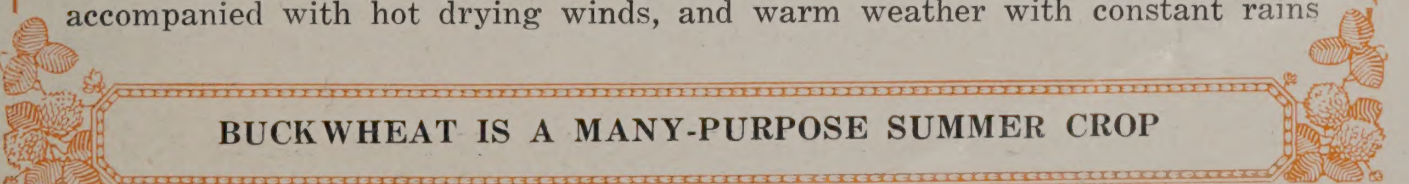
Buckwheat is not generally used as a pasture plant, although there is no reason why it should not be of value in this respect. The grain is a splendid poultry feed, and if well preserved, the straw, which is rich in minerals and carbohydrates, is readily eaten by stock. It makes good bedding for cattle, although it does not last long, but since it contains a large amount of mineral matter and decays quickly it makes good manure. Buckwheat is useful as a Summer orchard cover crop, and the only objection is that its rank growth may interfere with the gathering of the fruit; this, however, may be obviated by rolling down the Buckwheat, and thus furnishing a straw mattress on which the Apples may fall without injury.

Buckwheat is one of the best honey plants for Bees, as many blossoms are produced on one plant, which may continue to produce flowers for a month or more. It is estimated that an acre of Buckwheat, grown under good conditions, may supply as much as 150 lbs. of honey in a season. It is not advisable to grow Buckwheat alone for use by Bees, but it is better to utilise the crop in conjunction with some other good honey plant, such as Sweet Clover or Crimson Clover.

On account of the short period for which it occupies the ground, Buckwheat is useful for including in a series of crop rotations, and is particularly valuable for preceding Potatoes or Onions.

Buckwheat flour is extensively used in the United States for making griddle cakes and Buckwheat cakes and Honey or Maple Syrup is a regular article on the breakfast menu in that country.

CLIMATIC CONDITIONS.—Although Buckwheat grows through the Spring and Summer, it gives the best results where the climate is moist and cool. It is very sensitive to cold, but owing to its short growing season (from 10 to 12 weeks), and to the small amount of heat required to bring it to maturity, it is a very safe crop to rely on. At the flowering period, Buckwheat is sensitive to high temperatures and dry weather especially when accompanied with hot drying winds, and warm weather with constant rains



BUCKWHEAT IS A MANY-PURPOSE SUMMER CROP

BUCKWHEAT. (Continued.)

is also unsuitable. Buckwheat should make a particularly good Summer crop in Tasmania, and, generally speaking, should do well as a Summer crop wherever Rape can be grown successfully.

SOIL REQUIREMENTS AND PREPARATION.—Buckwheat will produce a better crop on poor quality land than any other grain, providing climatic and other conditions are favorable, but it also responds well to good treatment. The most suitable soil is a light, well-drained sandy loam, and the plant does not give good results on heavy wet soil. Buckwheat needs very little lime, and, in fact, seems to prefer an acid soil and land in which limestone is abundant is not suited to its cultivation. Where the soil is poor, it is profitable to use fertiliser.



Handpicking Canadian Wonder Beans for Export at Brunning's South Melbourne Store.

"BRUNNING'S SEEDS AN ADVERTISEMENT."

Messrs. F. H. Brunning Pty. Ltd.,
MELBOURNE.

The Willows,
COHUNA.
20/2/21.

Dear Sirs,

I got 1 cwt. of your Hunter River Lucerne seed from J. Keely, storekeeper here, and it was marked "Brunnings." So enough said, as the Lucerne spoke for the firm.

(Sgd.) S. STEVENSON.

Buckwheat is really a crop suitable for poor ground, under which conditions it can successfully compete with other grain crops, and for rich ground there are usually more profitable crops, although it may at times be good policy to grow Buckwheat in rotation on good quality land.

Although it will produce fair crops on land without proper soil preparation, care taken in making a good seed bed will be well repaid by better returns. The general preparation of the seed bed for Buckwheat is similar to that for Maize. Plough the land early in the Spring, and keep it in good condition by occasionally harrowing, disking, and rolling until the seed is sown. This cultivation provides a reserve of moisture, which goes a long way towards producing a crop, although good yields are often obtained on land ploughed and harrowed just before seeding.

FERTILIZER.—As Buckwheat is generally sown on poor ground, it will be found profitable to use fertiliser, and as a little Nitrogen in the soil is indispensable to the plant, which also requires a large amount of Potash (the

BUCKWHEAT IS A PAYABLE CROP ON POOR LAND

FODDER CROPS FOR AUSTRALIA

BUCKWHEAT. (Continued.)

straw and grain being particularly rich in this element), a mixed fertiliser principally composed of Superphosphate, but containing some Nitrogen and Potash, applied at the rate of 112 to 224 lbs. per acre is the most suitable. For medium to good class land, Superphosphate alone will fill all requirements. A little lime is also beneficial, but it is not necessary to use sufficient to neutralise the soil acidity in order to secure good crops of Buckwheat.

SEED SOWING.—Buckwheat is sown in the Spring, but not until all danger of frost is past, and as the grain fills best in cool weather, it is advisable to defer seeding so as to allow only sufficient time for the crop to mature before frosts occur; from the end of October till the first week in December is a good period, as when seeded late, Buckwheat is most likely to escape injury from the hot weather which, with drying winds and hot nights, causes the flowers to blast and thus fail to produce any grain. The seeding time for any locality, however, may be determined fairly accurately by allowing a period of 12 weeks for growth before the first killing frost is expected, especially as the cooler weather of Autumn is better suited for setting the grain.

To germinate, the seeds must absorb about half their weight of water, and the value of the preliminary soil preparation to conserve the soil moisture will be realised.

“HIGHLY PLEASED WITH THE RESULTS.”

Messrs. F. H. Brunning Pty. Ltd.,
MELBOURNE.

CORRYONG.
29/3/21.

Dear Sirs,

At our Show, held here last week, there were some exhibits of “GARAWI” Sudan Grass, Saccaline, Imphee and Japanese Millet; Sudan Grass, 9 weeks’ growth, was 12 feet high, grown on land that has been cropped for the past 28 years; Saccaline 15 feet high; Imphee 13 feet high; Japanese Millet 11 feet high; also some Broom Millet corn 18 feet high. ALL THESE EXHIBITS WERE FROM SEED PROCURED FROM YOUR FIRM.

The Sudan and Saccaline have come to stay in this district, as all who have grown them are highly pleased with the results.

Yours faithfully,

CUDGEWA DAIRY COMPANY LTD.

(Sgd.) A. W. Acocks (Manager).

In cool districts, two crops may be had in the same season, sowing early in the Spring, and making the second seeding immediately after the removal of the first crop.

The seed may be sown with a grain drill in rows 24 to 30 inches apart, and to a depth of from $\frac{1}{4}$ inch to 2 inches, according to the nature of the seed bed; under these circumstances from 40 to 45 lbs. of seed will be required per acre. Where convenient, drilling gives the best results, and is more economical as less seed is required, and cultivation may be practised; however, the most common method of sowing is to broadcast with the Cahoon Seed Sower, in which case from 50 to 60 lbs. of seed will be required for an acre.

A bushel of Buckwheat seed is legally regarded in the United States as 48 lbs., but in Australia, when sold in this way, 50 lbs. of Buckwheat seed is reckoned to the bushel.

HARVESTING THE CROP.—A self-rake reaper is one of the best methods of harvesting. The machine drops the cut plants in loose bunches, and these can later be gathered up and stooked. The ordinary reaper and binder is also satisfactory where conditions permit. Should frost threaten, the crop may be cut as soon as the seed of the first flowers are fully formed, and when cut at this stage the seed will mature in a few days.

If the plant is left standing until the first lot of seed is fully matured, considerable loss is occasioned from shattering, although this may be somewhat minimised by cutting in the morning, when the dew is on the plants, or in damp weather. After cutting, the Buckwheat is left stooked in the fields for about 10 days until dried out, by which time it should be in good condition for threshing.

GROW LEGUMES AND PLOUGH IN FOR GREEN MANURE

SUDAN GRASS

(Andropogon Sorghum, Var. Garawi.)

(Read also the notes on Sorghum, of which family Sudan Grass is a member.)
(See page 13.)

Sudan Grass is a member of the Sorghum family and a Summer-growing annual, which comes to maturity very quickly, the first crop being ready to cut in from 50 to 60 days after planting, according to weather conditions. The second cutting will be ready about 7 or 8 weeks after the first, and in a normal season a third will be obtained about 7 weeks later. In a favorable year, a fourth cutting will be secured, or the last growth can be allowed to stand for seed. Sudan Grass stools freely, and one plant will have as many as one hundred stems.



Genuine "Garawi" Sudan Grass.

The plant has a short fibrous root, and is killed out by frost, but, quite apart from this, can be easily eradicated and in this respect, differs from the perennial Johnson Grass, which is difficult to get rid of, on account of its underground root stocks.

"HAS GIVEN SPLENDID RESULTS."

"Langlands,"

BUNGOWANNAH, N.S.W.
July 5th, 1921.

Messrs. F. H. Brunning
Pty. Ltd., MELBOURNE.
Dear Sirs,

Last season I purchased from your firm a quantity of imported "GARAWI" Sudan Grass seed, which has given splendid results.

The first cutting I cut for hay, and have it stacked for a stand-by—the second growth I let ripen before cutting.

I have just finished threshing, and have now about 140 bags of real good seed—it is well filled, and a real good sample.

(Sgd.) E. J. WATSON.

Insure Against Drought. A SILO.

1. Saves the whole crop.
2. Prevents waste in feeding.
3. Allows you to keep more stock.
4. Makes cheap milk.
5. Saves storage space.
6. Provides succulent feed for Winter and Summer.
7. Sees you through a drought.
8. Clears the land for ploughing.
9. Helps utilize cheap roughage.

"WELL PLEASED WITH SUDAN."

Balhannah, S.A.

January 9th, 1920.

Messrs. F. H. Brunning
Pty. Ltd., MELBOURNE.
Dear Sirs,

I am well pleased with the grass (Sudan), and cannot speak too well of it.
(Sgd.) W. A. J. PEARSON.

"GARAWI" SUDAN GRASS, THE LEADING SUMMER FODDER

FODDER CROPS FOR AUSTRALIA

SUDAN GRASS. (Continued.)

Sudan Grass is thoroughly drought-resistant, and the acuteness of the need for such a crop is the greatest determining factor in its value; in this respect, Sudan Grass as the best of all annual "Summer Fodders," will always be regarded more highly in districts subject to drought, such as the Mallee and the Northern areas of Victoria, than in regions with a shorter warm season, and a more regular rainfall, such as Gippsland, although notwithstanding the shorter warm season, both in Gippsland, and the Western District of Victoria, Sudan Grass will, under reasonable conditions, give there equally as good or better results as Japanese Millet.

This plant is now also regarded as one of the best Summer Fodders throughout Queensland, New South Wales, South Australia and Western Australia, and the success achieved with Sudan Grass in practically all parts of Australia has led to a greater acreage being seeded each season in preference to Japanese Millet, Ambergene and other annual Summer Fodders so largely grown in the past.

DROUGHT ENDURANCE.—Although Sudan Grass may not produce as much per acre as Japanese Millet under exceptionally unfavorable conditions, it will yield at least two cuttings in an average season, and then stand semi-dormant through a period of drought, while if rain comes before the end of the growing season, the growth is immediately renewed. In very few instances has Millet been known to do this, and from experience it has been proved that during a term of years, Sudan Grass will out-yield Japanese Millet.

SPECIAL FEATURES OF BRUNNING'S "GARAWI" SUDAN GRASS

1. EXTREMELY DROUGHT-RESISTANT.
2. VALUABLE FOR PASTURING, OR CAN BE CUT AND FED GREEN AS REQUIRED.
3. THE BEST OF THE SUMMER HAY PLANTS.
4. CAN BE UTILIZED FOR ENSILAGE.
5. MOST PALATABLE TO STOCK, EITHER GRAZED, FED GREEN, OR AS HAY.
6. WILL GIVE FROM 3 TO 4 CUTTINGS IN A FAVORABLE SEASON.
7. GIVES SPLENDID RESULTS UNDER IRRIGATION.
8. THE LAST GROWTH CAN BE SAVED FOR A SEED CROP.

SEED.—The "quality" of the seed is of the first importance, and it is essential that Sudan Grass seed is free from any admixture of Johnson Grass or other Sorghums. Johnson Grass is a perennial plant with pernicious underground root stocks, and once established is impossible to eradicate, while the plant itself is very liable to poison stock. The best quality Sudan Grass seed is Brunning's true "Garawi" strain, which is especially grown to contract, is of the highest purity and germination, and absolutely free from Johnson Grass or cross-fertilisation with other Sorghums. The various members of the Sorghum family cross-hybridise very freely, and to preserve the true "Garawi" strain, and keep it pure, Brunning's "Garawi" seed is always saved from paddocks well isolated from Johnson Grass, or the other Sorghums.

SOIL REQUIREMENTS AND PREPARATION.—The best results are obtained on a rich loam, but Sudan Grass has been grown successfully on almost any class of soil, from heavy clay to light sand. In very sandy

"GARAWI" SUDAN GRASS IS THE TRUE STRAIN

SUDAN GRASS. (Continued.)

ground, however, the yield is liable to be light. Whatever land is available, thorough and adequate drainage is necessary. The soil preparation for Sudan Grass is the same as for Maize, a rather firm seed bed giving the best results. When it is intended to drill the seed, plough in the Spring and harrow down well. Spring ploughing is preferable for the seed bed, as it assists in warming the ground, and this is very necessary as the germination of Sudan Grass is delayed by a cool soil. On reasonably good land, no fertiliser may be necessary, but where the soil is of medium or very poor quality, use some manure, such as Superphosphate, at the rate of 84 to 112 lbs. per acre. Superphosphate has been found to be the best general fertiliser for Sudan Grass.



Sow Sudan Grass as Early as Possible to Escape the Summer Weeds.

Left-hand Crop: October Sowing—Scarcely any Weeds Showing.

Right-hand Crop: November Sowing—Note the Weeds.

Both Crops have had similar Cultivation, at the same time, and with the same Implements.

TIME AND METHOD OF SOWING.—In Victoria, seed may be sown from about the middle of September up to December, but in the Northern States, sowings may be made up to February. The earlier that seeding can be completed, the greater the results owing to the longer growing period available. Do not, however, sow while the soil is cold, as the seed is then liable to hang in the ground for some considerable time and possibly rot, or at the best a poor stand or slow stunted growth will be the result. In very dry regions, sow at the rate of from 3 to 4 lbs. per acre in drills, or about 15 lbs. per acre broadcast, but where ample moisture is available, either from abundant Summer rainfall or by means of irrigation, from 8 to 10 lbs. in drills, or from 20 to 25 lbs. broadcast is not too heavy a seeding per acre.

When sowing for hay, sow broadcast very thickly, as thick seeding produces the best quality hay, owing to the very much finer stems; Sudan Grass grown in cultivated rows is apt to be a little coarse, and is not so desirable for market hay. For home feeding, the coarseness will be of very little disadvantage, as the stems do not become sufficiently woody to be unpalatable to stock.

GROW "GARAWI" SUDAN GRASS AND MAKE INTO ENSILAGE

FODDER CROPS FOR AUSTRALIA

SUDAN GRASS. (Continued.)

When growing for pasture, cutting to feed green, or for ensilage, seed may be sown either in drills or broadcast. Remember that in the absence of irrigation facilities, the quantity of seed to be sown per acre varies according to the quantity of Summer rainfall, so that in very dry districts the lack of moisture must be compensated for as far as possible, by giving each plant a greater area of soil moisture to draw on, sowing in rows 36 inches apart, and cultivating frequently to conserve the soil moisture. (See article on this subject on page 19.) As shown previously, from 3 to 4 lbs. of seed is ample to sow an acre under these conditions.

For broadcasting Sudan Grass Seed, there is no better machine than the Cahoon Hand Sower, and when seeding in rows a common Grain Drill will fill all requirements.

The depth of seeding does not appear to have any marked effect on the root system of Sudan Grass, but generally speaking, the most suitable depth is from $\frac{1}{2}$ inch to 1 inch, although where the soil is friable, and does not become packed, the seedlings will force their way through to the surface, even when sown as deep as 3 or 4 inches.



A Nice Crop of "Garawi" Sudan Grass.

FOR HAY.—The usual way of harvesting Sudan Grass for hay is to cut with a mower. It cures readily, and can be cut in the morning and raked up that afternoon or the next day, providing the sun is bright. After bunching, it is stooked similarly to Millet, and removed from these stooks to the barn, after it has been thoroughly cured. Sudan Grass makes the best quality hay, if cut after full bloom, and when there remains no chance of an additional cutting, the hay will be improved by waiting until this stage of maturity is reached.

There are very few hay grasses which are injured so little by standing beyond the proper stage of maturity as Sudan Grass. This is due largely to the numerous stools arising from the base, maturing successfully later than the main stem, and furnishing immature stalks even when the main stem is ripe. This characteristic makes it possible to extend the haying process for a long period without any material loss, either in the quantity or quality of the hay, and such a feature is of great importance to the farmer.

CULTIVATE FREQUENTLY TO CONSERVE SOIL MOISTURE

SUDAN GRASS. (Continued.)

PASTURING SUDAN GRASS.—In conjunction with these notes, it is necessary to carefully read the remarks on Pasturing Sorghums (page 16), and Sorghum Poisoning (page 16), as well as the paragraph on "Stock Poisoning," as related especially to Sudan Grass.

It appears that Sudan Grass is comparatively harmless to pasture in the earlier stages of growth as compared with the other Sorghums, and although many successful growers graze their stock on Sudan Grass at all stages, it is nevertheless advisable to err on the side of caution, and should the crop have been stunted by frosts or a period of drought, cut for green feed.

Where the crop is growing steadily, it is better to try a beast or two of inferior value before letting the flock follow, as recommended on page 17, see Sorghum Poisoning. The experiences of various growers of Sudan Grass on page 37 will also be of value to the reader. After the flowering stage has been reached, Sudan Grass is quite safe to pasture, the poisonous element (if any), having quite disappeared by this time.



A Second Cutting of "Garawi" Sudan Grass, taken 4 weeks after the first. In this time, the Second Growth reached 5 feet, with only one watering.
Photograph kindly sent by Messrs. Pearce Bros., Tooleybuc, N.S.W.

GENERAL TREATMENT.—When planted in rows, frequent cultivation is necessary to conserve the soil moisture. In dry regions with a light rainfall where irrigation facilities are not available, the best results will always be secured from sowing in rows and cultivating regularly, although as previously stated, when seeding for hay, broadcasting gives the best results, as the thicker the seed is sown the finer the stalks and the better the quality of the hay.

FOR GREEN FEED.—The remarks on this heading under "Sorghums," see page 16, apply equally to Sudan Grass, and providing the grass is allowed to wilt for several hours before being fed to stock, the crop can be cut and used with perfect safety at any stage of its growth. When required for ensilage, cut at the same time as for hay.

AS A SEED CROP.—When sown for seed, Sudan Grass is harvested like the small grains with an ordinary grain binder, and allowed to cure in stooks. When cut for seed, the first heads should be fully ripe, as the stools will ripen somewhat later than the main stem, and there is seldom any great loss from shattering.

FODDER CROPS FOR AUSTRALIA

SUDAN GRASS. (Continued.)

STOCK POISONING.—The important subject of stock poisoning by Sorghums (Sudan Grass is a member of the Sorghum family) is dealt with very fully on pages 16 to 18 under "Sorghums," but as farmers have been under some apprehension regarding stock poisoning by Sudan Grass, the following remarks will be of interest.

Although it is advisable to use care in feeding off Sudan Grass, it seems as if the genuine true "GARAWI" strain is quite safe for pasturing at any stage of its growth, and where cases have been reported of stock being poisoned after pasturing on Sudan Grass, it is likely that the seed used to produce the crop was cross-fertilised with Johnson Grass or one of the other Sorghums.

Mr. E. Breakwell, Government Agrostologist, Dept. of Agriculture, Sydney, writes (30/5/21):—

"Sudan Grass seems to be practically harmless at any stage of growth. In New South Wales, it has been grazed at all stages without any ill effects, and two analyses, one by Dr. Petrie, of the Sydney University, and the other by the Chief Chemist, Dept. of Agriculture, Sydney, have shown no signs of hydrocyanide (prussic acid)."

Mr. A. Glass, of Messrs. Glass Bros., Nanneella, via Rochester, states (1/6/21):—

"I have grazed stock on Sudan Grass in all stages of growth for the last four years, and during that time have never lost a beast, sheep, cattle, or horse."

As drawing a comparison between poisoning of stock from the other varieties of Sorghums and a similar danger in connection with Sudan Grass, Mr. A. Glass stated "that he would never use Sorghums for grazing until the seed head was shot."

Mr. John A. Watt, Bonac, Dalby, Queensland, writes (29/4/21):—

"I used to grow Japanese Millet on a large scale, but since I have gone in for growing Sudan I have no room for any of the Millets. Sudan stands out on its own against all the others, both as a green fodder or as a plant for grazing, which is perfectly safe to graze at all stages, and for hay purposes is equal to Oat hay if cut when it comes out in the flower stem; all classes of stock, horses, cattle, sheep and even pigs will eat it when in the hay stage."

Mr. A. E. V. Richardson, Agricultural Superintendent, Dept. of Agriculture, Melbourne, writes (8/6/21):—

"With Sudan Grass, the danger of poisoning is much less than with other Sorghums. A few cases of poisoning with this grass have been reported in the United States, and one case in Australia; but, when one considers the number of stock pastured on Sudan Grass during the last few years, the percentage of poisoning cases is very low.

"Experiments have shown that on the average, Sudan Grass contains only about one-third the amount of prussic acid found in the other Sorghums. With this grass, also, the amount present is greatest in young plants, and decreases rapidly as the plant matures.

"Provided due caution is exercised in pasturing Sudan Grass, very little danger exists at any stage of growth unless the plants have suffered a severe check by frost or drought."

While the above reports show there is practically no danger with Sudan Grass at any stage of growth unless the plants have suffered a severe check by frost or drought, it is nevertheless advisable to take precautions, and should circumstances necessitate using the crop before the flowering stage, the grass can be cut and fed green, when if allowed to wilt for a few hours before being fed to the stock, it will be quite safe, as the poisonous element being volatile, will have disappeared completely by that time.

Should it be necessary to graze Sudan Grass in the earlier stages of growth, especially if the stock have come off dry feed, it would be advisable to take the precautions set forth on page 17, under the heading of "Sorghum Poisoning."

SEE PAGES 4 TO 6 FOR DETAILS OF SUGAR MANGELS

SUDAN GRASS. (Continued.)

SUDAN GRASS IN MIXTURES.—Sudan Grass is well suited for growing in mixtures with the annual Summer fodder legume Cow Peas, seeding in drills 24 to 36 inches apart. Cow Peas and Sudan Grass make a well balanced ration, and although the yields are not as great as those of Sudan Grass grown alone, there is very little loss by the inter-mixture of the legume, while the feeding value of the hay is considerably enhanced. The Cow Pea is also a soil improving plant, and could, if necessary, after the second or third cutting of Sudan Grass had been taken, be ploughed under for green manure, thus restoring to the ground, the nitrogen and humus absorbed by the Sudan Grass.

Twenty to thirty pounds of Cow Peas, and from 2 to 3 lbs. of Sudan Grass seed will be required to sow an acre; the quantity varying according to the distance of the rows. (See also Cow Peas, page 22.)

JAPANESE MILLET

(*Echinochloa Frumentacea*.)

Japanese Millet, sometimes known as Barnyard or Billion Dollar Grass, is amongst the best annual fodders for late Spring, Summer and Autumn feed, and Japanese Millet not only does well in most parts of Victoria, but throughout Queensland, New South Wales, South Australia, and parts of Tasmania. Japanese Millet has been successfully grown as far south as Hobart by Mr. George Beedham, Claremont, and has given splendid results.

UTILIZATION.—Japanese Millet is a splendid drough resister, but will not withstand frost, and its period of growth is therefore late Spring, Summer and Autumn. Japanese Millet can be pastured, cut and fed green, made into hay, or utilised for ensilage, and in addition, the last growth may be allowed to run to seed. Do not feed Japanese Millet hay to horses alone, but mix with oaten hay, which renders it non-injurious, and gives the chaff a nice green colour.

SOIL PREPARATION.—As lumpy or hollow ground is bad, the soil must be well worked and a firm seed bed prepared. The secret of success in growing Millet is shallow seeding and sowing only when the ground is warm; hence, with shallow surface soils, deep sowing is not advisable, and especially where the soil is loose and open, rolling before seeding is very necessary.

SEED SOWING.—Japanese Millet seed can be sown from September to January, either in drills or broadcasted. Sowing in drills 7 inches apart, from 8 to 10 lbs. of Brunning's "Standard" quality seed, and where broadcasted from 15 to 20 lbs. of the same high-grade seed is required per acre. These figures are for the best quality seed, and larger quantities per acre of inferior grades would need to be sown.

Be careful not to sow too early, nor too deep, from 1 to 1½ inches being quite sufficient depth. Seed put down too deep, or sown too early in cold ground, will only go mouldy, the result being a very poor germination.

SUBSEQUENT TREATMENT.—Japanese Millet comes in very early, and can be fed off in from 4 to 6 weeks after seeding. When intended for grazing only, it is advisable to pasture when the plants are about 6 inches high, feeding down fairly close, which tends to make it stool out and become much thicker. After being pastured, take the stock off the paddock, and where irrigation is available, apply the water.

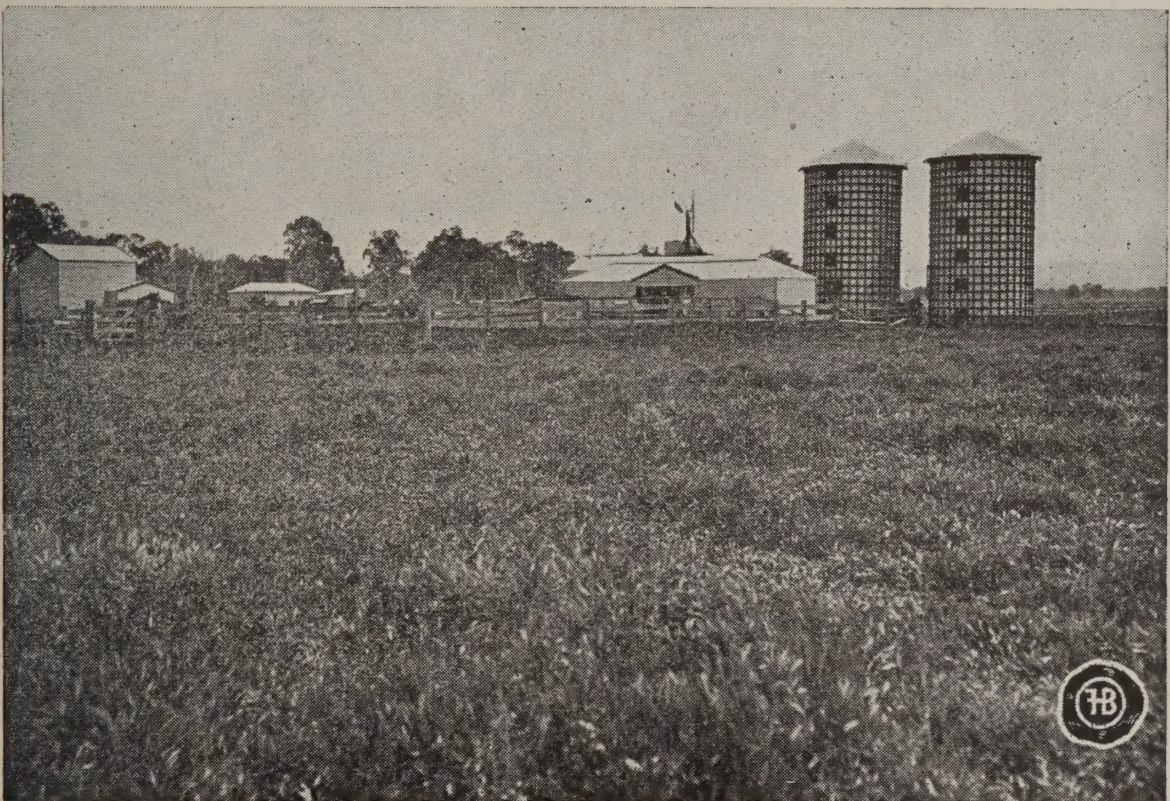
Where possible, harrow the paddock with a set of sharp harrows across the drills, and allow the crop to again grow to a height of 6 to 10 inches, at which stage it can be further pastured. With this treatment, Japanese Millet can be kept growing throughout the Summer, and will carry from 10 to 15 sheep per acre. Harrowing is necessary at least three times during the season, and the increased growth of the crop will show the benefit of this operation.

FODDER CROPS FOR AUSTRALIA

JAPANESE MILLET. (Continued.)

To keep stock too long on any one paddock, means less actual growth as well as the trampling down of the Millet, whereas by sub-dividing up into three or four paddocks, the intervals of rest soon restore any damage done in this way.

When grown to be cut for green feed, hay or ensilage, sow the seed in drills 15 inches apart, and work the scuffler between the rows until the Millet is about 3 feet high. Cut the plants well before the seeding stage, and not less than 3 inches from the ground. This is particularly important as too close cutting is liable to kill some of the plants. Before feeding to stock, especially cows, be careful to allow the Millet to lie and wilt for two or three hours.



A Drought Insurance: A Crop from Brunning's "Standard" Quality Japanese Millet Seed.

If desired after the second cutting, the crop may be left to seed; if intended for hay, do not allow it to go too far, otherwise the plants become woody and fibrous, and consequently indigestible; the most suitable time for cutting Japanese Millet for hay is just before the flowering stage.

Cut the crop with a binder, making into small sheaves loosely tied so as to allow of drying without becoming mildewed. Stook in rows, not too thickly, after which it can be stacked similarly to Oats or Wheat.

SEED.—The best seed is always the cheapest, and this applies equally to Japanese Millet; Brunning's "STANDARD" quality machine-dressed, graded and tested Japanese Millet is the highest grade on the market, and is noted for its "plumpness of seed," thus ensuring good strong growing plants, its "freedom from husk, weed seeds and other foreign matter," as well as its "high percentage of germination," thus requiring a lesser quantity of seed per acre than ordinary grades, and consequently actually costing less per acre to seed while ensuring (with reasonable conditions) a first-class crop.

SWEET CLOVER, THE RESTORER OF WORN-OUT LAND

WHY LIME IS VALUABLE TO SOILS

Lime improves the physical condition of both clay ground and sandy soil. It is rather hard to realise at first glance that both clay ground and sandy soil, which are apparently so dissimilar, are both acted on in the same way by lime, and that the action of this element is in each case to bind together the particles of which all soils are made up. By what is actually a process of binding, clay ground is apparently broken up while the actual effect of the lime on the sandy soil which appears to be of a much looser texture is the same, as the lime binds this class of ground by firming and compacting the loose open surface.

In clay the soil particles are so fine that they render the soil very tenacious, and if pure clay be mixed with a large quantity of water, the result will be a muddy liquid showing practically no sign of depositing its suspended matter. The addition of a small quantity of lime water gives coagulation of the clay particles with complete separation as a flocculent precipitate. Thus, when lime is applied to clay soil, the same style of action takes place, and the aggregations of small particles work more like a soil of larger particles and more friable nature.

As mentioned above the action of lime on sandy ground is actually the same, and the ultimate effect of this element is to firm and compact the loose open nature of this class of soil.

FUNCTIONS.—Lime is one of the necessary plant food constituents, consequently it must be in any soil from which it is expected to produce crops. Lime also tends to liberate from its insoluble forms of combination, another essential plant food substance in Potash, and thus converts it into a condition in which it is readily available to the plant as food.

Lime is also an essential constituent for the development of the micro-organisms which bring about the formation of nitrates in soils, and it is also necessary to neutralize the acids that are naturally formed in the process of decay of the organic matter present in soils.

It will thus be realised that Lime has a very important function to perform.

FOUR ESSENTIALS OF SUCCESSFUL SOIL MANAGEMENT ARE:—

1. Soils must be properly drained to be most productive.
2. The supply of humus in the ground must be maintained.
3. The soil must be kept sweet by regular applications of lime to secure the maximum crop products.
4. Plant food must be abundant and properly balanced if the best crops are to be produced.

DIFFERENT FORMS OF LIME.—Burnt Lime or Quick-Lime is the freshly burnt Lime, and is the more concentrated form in which it may be applied, and must be finely ground, water-slaked, or better, air-slaked before applying. The ground Lime and water-slaked Lime have a tendency to unduly hasten the decomposition of organic matter, especially in sandy soils, and should never be applied in this form as a top dressing on young plants, for, being so caustic in nature, they will burn and even kill the plants. From three-quarters to one ton of either of these materials is quite sufficient per acre.

Air-slaked Lime is formed when Lime is exposed to the air. The carbon-dioxide in the air is absorbed, and the Lime is converted into Lime-carbonate, as it was before being "burned," only in the form of a powder. In this form, it has lost its caustic properties, and can be applied in any way desired. The



ACID SOIL MEANS FAILURE. LIME YOUR LAND



FODDER CROPS FOR AUSTRALIA

THE VALUE OF LIME. (Continued.)

taking up of carbon dioxide nearly doubles the weight, and this must be taken into account in deciding how much of it should be applied. From twenty to thirty cwt, will be required per acre, according to the acidity of the soil.

Ground Limestone is just common limestone rock that has been passed through a crushing or pulverising machine. To ensure quick results, limestone should be finely ground.

TESTING SOIL FOR ACIDITY.—This mineral plant food constituent is very easily leached from the soil. An abundance of the decaying matter is essential in cultivated ground, and in the process of decay, acids are formed which render the lime and salts of the soil soluble. It naturally follows that the more organic matter decaying in the soil the sooner it will be depleted of its supply of Lime, and it is probably due to the better aeration of sandy soils and the consequent supply of acids that this class of soil is more frequently deficient in Lime than clayey ground. Where this does occur the available supply of phosphorus is also small.

On the average an application of Lime is necessary about every three years, but it is easy to test soil to determine its need of Lime, although this element may generally be applied at reasonable intervals with the full assurance of its value unless it is known that a thorough application had been recently made.

The test for soil acidity, or rather the need of Lime, is as follows:—

“Place some soil in a cup or glass with a trowel, not with the hand. Make it wet enough so that it can be stirred with a stick. Open a slit in the soil with a case-knife blade, and insert a piece of blue litmus paper obtained at a drug store. Press the soil against the paper. In an hour remove the paper. If it is distinctly pink, the soil is extremely acid. If it is faintly pink, the soil is slightly acid.”

HUMUS ESSENTIAL TO GOOD SOIL

- | | |
|--|------------------------------------|
| 1. ENLIVENS THE SOIL. | 5. KEEPS THE SOIL LOOSE AND WARM. |
| 2. MAKES A HOME FOR BACTERIA. | |
| 3. ADMITS AIR AND WATER INTO THE SOIL. | 6. MAKES THE SOIL MORE PRODUCTIVE. |
| 4. RETAINS THE MOISTURE. | 7. PREVENTS WASHING AND BAKING. |

WHEN AND HOW TO APPLY LIME.—The best time for application is a few weeks prior to seeding the crop, and to be most effective Lime should not be ploughed down, but thoroughly worked in by harrowing. On clay land, applications may be made during the Autumn, Winter or Spring, but on very sandy soil, Spring application is probably the best.

When using freshly burnt Lime put it down in small heaps and cover with earth, then when properly slaked spread in the same manner as fertilizer. If either air-slaked Lime or Carbonate of Lime be used, spread from the waggon. A little practice will enable the operator to spread both quickly and evenly, although lime-spreaders built on the plan of a grain drill are now on the market, and do the work well.

Lime, whether freshly burnt, incompletely air-slaked, or water-slaked, must never be mixed with farmyard manure. These forms of Lime hasten the decay of the manure and bring about the liberation of Ammonia, thus causing the loss of one of the most costly constituents of the manure. Ground limestone, marl, and fully-slaked Lime may be mixed with the manure without doing any appreciable harm.

LIME IS THE FAIRY GODMOTHER TO MOST SOILS

SECTION 4—CLOVERS

The term Clover is applied not only to members of the *Trifolium* family (the true Clovers), but is also generally meant to include the Melilots, some of the Medicagos and the Birdsfoot Trefoils which are members of the Lotus family. *Lezpedeza Striata* (Japan Clover) is a member of another family, and is not a true Clover, but as it is generally regarded as such, is included in this section. The true Clovers most generally in use, apart from Subterranean Clover, Berseem Clover, and Strawberry Clover, which are described separately and in full detail are:—

White Dutch Clover (<i>T. repens</i>).	Suckling Clover (<i>T. minus</i>).
Alsike Clover (<i>T. hybridum</i>).	Crimson Clover (<i>T. incarnatum</i>).
Cluster Clover (<i>T. glomeratum</i>).	Red Clover (<i>T. pratense</i>).
Cow Grass (<i>T. pratense perenne</i>).	

Medicago lupulina (Trefoil, Black Medick, or as it is sometimes erroneously called, Hop Clover) and the two Burr Clovers, *Medicago denticulata* and *Medicago maculata* can also be regarded as "General Clovers" and will be dealt with as such. *Melilotus Alba* (Sweet or Bokhara Clover), and *Melilotus indica* or *parviflora* (King Island Melilot) as well as the various varieties of Lotus or Birdsfoot Trefoils (Major, Corniculatus and Angustissimus) are dealt with separately.

Lime is the Fairy Godmother to most soils. It makes heavy soils lighter, and light soil more retentive. It is the "key" of Nature's store, for it sweetens the sourest and most infested of soils.

GENERAL CLOVERS

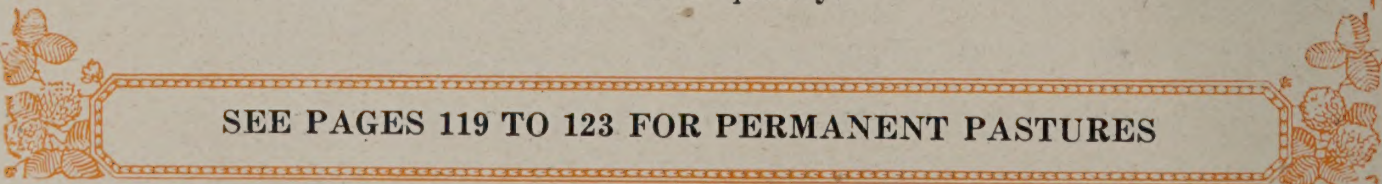
General Clovers most largely used include, as previously explained, seven members of the *Trifolium* family, and three varieties of *Medicago*, each of which is briefly dealt with. These Clovers and Medicagos are too well known to need more than passing mention.

CLUSTER CLOVER

(*Trifolium glomeratum*).

Cluster Clover, Bush Clover or Native Trefoil is a very useful Clover of creeping habit with tiny pinkish flowers and small globular seed heads. In spite of the generally accepted opinion, Cluster Clover is not indigenous to Australia, but was introduced by some of the early settlers. Once established, this Clover is very permanent and propagates itself by the creeping roots as well as by seed. Cluster Clover is particularly well suited for sowing in mixtures for the Western District of Victoria, Flinders Island, King Island and the North-West Coast of Tasmania. It is not adapted for sowing alone, and for this reason should always be included in mixtures with other grasses and clovers.

Sow the seed in the Autumn at the rate of 20 lbs. per acre when sown alone, or at the rate of from 3 to 4 lbs. per acre in mixtures. These quantities are reckoned for Brunning's Fancy Grade Re-cleaned Seed, and would need to be increased for seed of inferior quality.



SEE PAGES 119 TO 123 FOR PERMANENT PASTURES

WHITE DUTCH CLOVER

(*Trifolium repens*).

Trifolium repens is known by the familiar names of White Clover, Dutch Clover, White Dutch Clover, White Trefoil, Creeping Trifolium and Honey-suckle Clover, the latter name having been given doubtless on account of the honey it furnishes for bees. It is perhaps the best known of all the Clover family, and on account of its general all round suitability perhaps one of the most widely used. White Dutch Clover is perennial, the stems creeping along the ground and rooting at the joints, so that from this source plants are multiplied indefinitely. It may also be easily established from seed.



White Dutch Clover.

White Dutch Clover is quite hardy, and seems to be able to adapt itself to a great variety of climatic conditions, although better suited to a moderately cool climate than to one which is hot, and to a moist, humid climate than to dry weather conditions. Although it will live through dry seasons, it does not thrive in a climate too dry for cereals such as Barley.

White Dutch Clover seems to have established itself in many parts of Australia, having doubtless been distributed by cattle which are very fond of its palatable herbage, as it very often appears in pastures where it is definitely known no seed has previously been sown.

White Dutch Clover is seldom sown alone and is really more suitable for inclusion in mixtures with other grasses and clovers, and there are very few permanent pasture mixtures of this description in which it cannot be profitably included. When sown alone, from 12 to 14 lbs. of seed is required to sow an acre, but in mixtures with other grasses and

clovers, from 1 to 2 lbs. of seed per acre will be found ample, especially as not only is the seed small, but when once established, the plant propagates itself with such facility. White Dutch Clover may be sown from the first Autumn rains in March or April up to the end of June, and again in the Spring from August to September. Spring sowing, however, would only be advisable in districts with a good Summer rainfall, or where the Clover is included in mixtures sown on land which commands irrigation facilities.

SUCKLING CLOVER

(*Trifolium minus*).

Suckling Clover, or, as it is sometimes called, Sheep's Trefoil, is a small, yellow-flowering annual Clover, very useful for including in pasture mixtures on strong land, as it forms a dense mass of herbage and re-seeds itself every year. The plant matures early, but is liable to disappear in dry weather. It is very seldom sown by itself, and is really only adapted for seeding in mixtures with other grasses and clovers. The seed is sown in the Autumn or early Winter at the rate of 15 lbs. per acre when used alone, or at the rate of 2 lbs. per acre in mixtures.

ALSIKE CLOVER

(*Trifolium hybridum*).

Alsike Clover, also known as Swedish Clover, Alsace Clover, or Hybrid Clover, is a cross between White Dutch Clover (*T. repens*) and Red Clover (*T. pratense*). The flowers are of a pinkish shade; the plants have fairly fibrous roots, and a slender tap root, which goes down a fair depth in the ground, while the flowers are similar in appearance to those of White Dutch Clover, although larger and of a pinkish shade.

Alsike is a perennial, and under favorable conditions will last for many years. While Alsike is useful for pasturing, the quality of the hay is first-class and is suitable for all stock, but owing to its fineness is especially well adapted for sheep. As a honey plant, Alsike is only rivalled amongst the clovers by *Melilotus alba* (Sweet Clover) and is extremely valuable for growing for bee pasture.

Alsike is very hardy as regards cold and is better adapted to cool and humid districts than to dry districts. It does well on all classes of land except poor sand and gravelly ground. One especially valuable feature about this Clover is that it is practically the only useful member of the family with the exception of the Strawberry Clover that will withstand an excess quantity of moisture, and apparently the only one that will thrive on land inclined to be acid.

Owing to its ability to withstand surplus moisture, Alsike is especially suitable for growing under irrigation, and has already been proved to be a most valuable Clover in Permanent Pasture Mixtures of grasses and clovers grown under irrigation in the Northern Areas of Victoria. Alsike and Timothy also makes a first-class mixture for this purpose, and the yields are in excess of those obtained when these two plants are grown under more natural climatic conditions, but without irrigation.

Alsike is seldom sown alone, and is very useful for seeding in mixtures. This is especially advisable in moist situations as the plants are liable to lodge, and hence the necessity, when grown for hay, of including some other grasses that will help to keep the plants erect. Sown alone 12 lbs. of seed would be required per acre, but in mixtures from $\frac{1}{2}$ to 2 lbs. per acre will be found ample. The best period for sowing Alsike is from the first Autumn rains in March or April to the end of June, and Spring sowing cannot be regarded as being advisable. All Alsike seed used in Australia is originally imported from Canada and U.S.A., and is liable to contain the noxious Canadian or Californian thistle. Agriculturists are advised at all times to stipulate that the seed is free from this scourge. Sometimes Alsike seed contains a small percentage of Timothy and even White Clover, but these are useful plants and no detriment to the quality.

Brunning's believe that it is the duty of every business organization to do something to built up the community in which it does business, quite apart from the things that it is required to do by law, or those things directly beneficial to itself. This is nothing more than carrying out the obligations of citizenship.

COW GRASS OR PERENNIAL RED CLOVER

(*Trifolium pratense perenne*).

This Clover is said to have originated in a cross between the ordinary Red Clover (*T. pratense*) and Zigzag Clover (*T. medium*). The latter variety is one that is not in commerce. The name of Zigzag Clover is sometimes erroneously applied to Cow Grass, which also bears the vernacular names of Giant Clover, Sapling Clover, Meadow Clover and Pea Vine Clover. The Giant Cow Grass is really only a stronger growing variety of the ordinary *Trifolium pratense perenne*. Cow Grass is biennial under some conditions

"TARWEI" STRAWBERRY CLOVER FOR MOIST, HEAVY LAND

FODDER CROPS FOR AUSTRALIA

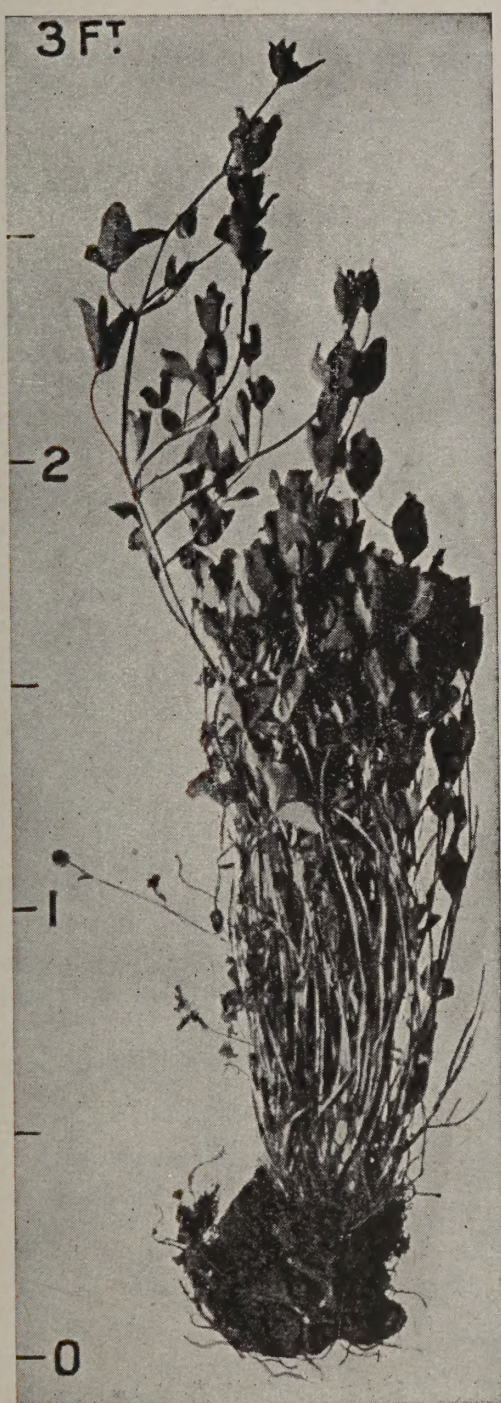
COW GRASS OR PERENNIAL RED CLOVER. (Continued.)

and perennial under others, although in any case, it is not a long-lived perennial. Being of a stronger habit of growth than the common Red Clover, it is better fitted for adverse conditions, more especially when it has once obtained a hold upon the soil. The plants are much stronger, the stems are much larger and softer, and the roots as a rule are larger and stronger than those of the common Red Clover, and as a result have more power to gather plant food in the soil. This penetrating habit affords a means of sustenance to the plant on land too poor to grow Red Clover.

Cow Grass is valuable for pasturing or can be cut and made into hay of first-class quality and like all the Clovers, it is a good soiling plant. While

a satisfactory crop sown by itself, it is a very valuable ingredient of most permanent pasture mixtures. Sown alone, 20 lbs, of seed will be required per acre, but when included in mixtures with other grasses and clovers, the quantity of seed varies from 1 to 4 lbs. per acre, according to conditions. Cow Grass is hardy and gives the best results sown in the Autumn or early Winter. Cow Grass is adapted to many mixtures, and will give good results under varying conditions. It is suitable for a variety of soils, and does well on sandy ground with a clay subsoil. Cow Grass, like the common Red Clover, is not suitable for hungry, sandy soils or wet, peaty ground. (For the latter class of ground, see page 62, "Tarwei" Strawberry Clover).

When grazing cattle and sheep on either Cow Grass or the common Red Clover there is always some danger of hoven or bloat. This danger is greatest when the animals are turned in on the Clover in a ravenously hungry condition, when it is wet with rain or dew, or in a more than ordinarily succulent condition. The chances of "bloat" may be minimised, although not altogether eliminated by giving the animals access to other food, such as dry Clover or Lucerne hay before turning them in on the pasture, and where the field consists of mixed grasses and clovers, the danger is always less in proportion as grasses are abundant in the mixture.



A Plant of Cow Grass.

Some imported Cow Grass seed is liable to contain dodder, and readers are advised to stipulate for dodder-free seed when purchasing. Brunning's Cow Grass and Red Clover seed is all specially re-cleaned and absolutely free from dodder.

BRUNNING'S CLOVER SEEDS ARE THOROUGHLY RELIABLE

RED CLOVER

(*Trifolium pratense*).

The common Red Clover, sometimes known as Broad Clover, may be regarded as a biennial only, as the duration of the life of this plant is more or less influenced by pasturing and cutting for seed. Grazing the plants has the effect of prolonging the period of their growth, while allowing them to mature and form seed has the opposite effect.

The Common Red Clover is very similar in appearance to Cow Grass both in the foliage and the flowers which are of a beautiful purplish crimson, but is of more rapid growth and generally comes in 2 or 3 weeks earlier. Red Clover furnishes excellent pasture and can be cut and cured into first-class hay suitable for cattle, sheep and horses. The danger of bloat or hoven is equally as bad with the common Red Clover as with Cow Grass (see page 45), but reasonable precautions will reduce this to a minimum.

Seed may be sown from the first Autumn rains (March/April) up till about the end of June at the rate of 20 lbs. per acre when sown alone; when used in mixtures with other grasses and clovers, from 2 to 4 lbs. of seed per acre will be required according to conditions. Both Cow Grass and Red Clover are valuable for including in permanent pasture mixtures to be grown under irrigation in the Northern areas of Victoria.

BURR CLOVER

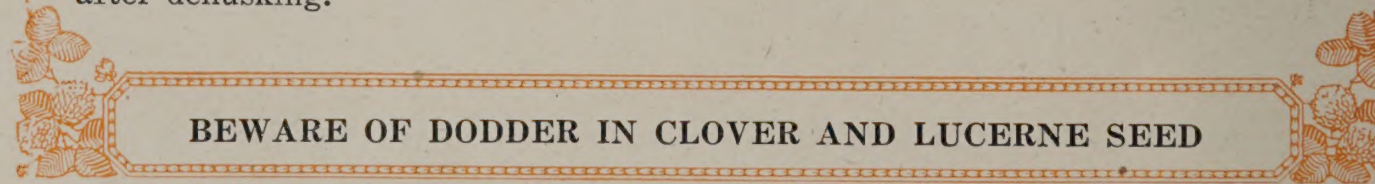
(*Medicago maculata* and *Medicago denticulata*).

There are two varieties of Burr Clover, both of which are familiarly known as Australian Burr Clover. The habit and growth of the two plants appear to be the same, the only difference being that *Medicago maculata* (sometimes known as Spotted Clover, Californian Clover and Yellow Clover) has a black spot in the middle of the leaflets, whereas the other, *Medicago denticulata*, has a plain green leaf. Both varieties are thoroughly established in Australia.

The Burr Clovers are free growers, and being legumes, are useful for enriching the land; they improve the soil mechanically through the root growth, and also through the stems and leaves when ploughed under for green manure. Both varieties are botanically annuals, but if allowed to mature, will re-seed themselves from year to year, and once established may be regarded as fairly permanent. They are well suited for growing on dry land or hill sides, and will do well throughout Victoria except in the very cold districts. For improving the land, seed of the Burr Clovers can be planted in the Autumn and the plants ploughed under in the Spring.

From 10 to 12 lbs. of clean or shelled seed is required to sow an acre, and as Burr Clover is really a Winter or early Spring growing annual, the earlier seeding can be carried out, the longer the growing season so that where possible sowings should be made in March and certainly not later than the first or second week in April.

As a general rule, seed is only available of *Medicago denticulata*, but apart from the disparity in the leaf there does not appear to be any striking difference between the two sorts, either in yield, hardiness or growth. The seed is generally secured by being cleaned out of the wool of sheep during the process of manufacture and prior to the war was principally imported from Germany. It will thus be realized that available supplies of seed are somewhat intermittent, although Burr Clover seed is now procurable from time to time in America as well as locally. All Brunning's Seed is recleaned after dehusking.



BEWARE OF DODDER IN CLOVER AND LUCERNE SEED

CRIMSON OR ITALIAN SCARLET CLOVER

(*Trifolium incarnatum*).

Trifolium incarnatum is known by the names of Crimson Clover, Italian Scarlet Clover, Italian Clover and Carnation Clover. Crimson Clover is an annual with an erect habit of growth and a considerable power of stooling. the flower heads are long, cylindrical and cone shaped; the bloom is of a beautiful rich crimson shade and a crop of Crimson Clover in full bloom is a beautiful sight. The plants will attain a height of from 2 to 3 feet, while the root growth is fully twice that of the stems. The roots are strong, going straight down into the soil.

Sown in the late Summer or Autumn, the growth of the crop is completed by the end of the following Spring and Crimson Clover is therefore valuable as a catch crop or for growing for an orchard cover crop. Being hardy, it will make growth all through the Winter when other clovers are practically dormant. Crimson Clover is very palatable to stock and can be used for grazing, cut for green feed or ensilage or cut and made into hay.



A Plant of Crimson Clover.

While Crimson Clover is a plant of considerable usefulness, it has now been more or less superseded by "Mesgawi" Berseem Clover, which possesses all the virtues of the Crimson Clover and gives a greater number of cuttings in a shorter period, but being hardier Crimson Clover is more suitable for districts with a very severe Winter. It is also valuable as a soil improver owing to the strong development of the root growth, and is therefore useful for ploughing under for green manuring in the orchard.

The best results are obtained by sowing seed as early as possible in the Autumn, but seeding may be carried out from the first Autumn rains up to the middle or end of June. Sown alone from 12 to 15 lbs. of seed will be required to sow an acre, but Crimson Clover can be profitably used in mixtures with permanent grasses and clovers to furnish a bulk of early feed, in which case from 3 to 4 lbs. of seed per acre will be ample.

Crimson Clover and Italian Rye Grass make a first class annual mixture for late Winter and Spring feed, seeding in the early Autumn at the rate of 25 lbs. of Italian Rye Grass and 5 lbs. of Crimson Clover per acre.

CRIMSON CLOVER IS EXCELLENT FOR GREEN MANURING

TREFOIL OR BLACK MEDICK

(*Medicago lupulina*).

Trefoil or Black Medick Clover is a fibrous-rooted biennial with bright lemon yellow flowers somewhat similar in shape, but much smaller than those of White Dutch Clover. The name "Black Medick" originally arose from the black seed pods which are an infallible mark of identification of *Medicago lupulina*.



Black Medick or Trefoil Clover.

Trefoil grows freely on most soils, and is very valuable for including in mixtures for poor ground except where the land is quite devoid of lime, which appears to be one of its special necessities. Although only a biennial, Trefoil re-seeds itself so freely as to be practically permanent. It yields nutritious pasturage, and may be cut for hay, although it is not the equal of the other Clovers for this purpose. Trefoil is rarely sown alone, being generally included in mixtures with other grasses and clovers, and where climatic conditions are suitable, it grows well in mixture with Meadow Foxtail, Sweet Vernal and Kentucky Blue Grass. When included in mixtures, it is advisable to sow Trefoil sparingly, otherwise owing to its very heavy growth it is liable to smother out other clovers and grasses.

Seed may be sown from the first Autumn rains (March-April) up till the end of June. When sown alone 20 lbs. of seed will be required per acre, but in mixtures from 1 to 2 lbs. will be ample for that area. The seed is of a bright golden color, and very similar in appearance to that of Lucerne (*Medicago sativa*.)

JAPAN CLOVER

(*Lezpedeza Striata*.)

Japan Clover is an annual, with flowers varying in color from pink to a purplish-rose, and is said to have been originally introduced into the United States from China about 1850. It is not a true legume, although sometimes grown for soiling purposes, and for this purpose has proved of value in the Southern States of America. The plant is principally used for grazing, but also makes hay of good quality, although the quantity is small. Japan Clover is suited to warm, humid climates, and should be useful in parts of Queensland. It should give good results under irrigation in Northern Victoria.

Seed is sown in the Spring, and the plants grow quickly, but suspend growth entirely during any droughty periods in the Summer, starting off again with any Summer rains, and continuing growth in the Autumn until killed out by the early Winter frosts. Providing the plants have an opportunity of maturing, they will re-seed themselves from year to year. The seed, which is usually of low viability, is broadcasted at the rate of from 10 to 15 lbs. per acre.

Brunning's Genuine "GARAWI" Sudan Grass will, however, under Australian conditions, do all or more than could be reasonably expected of Japan Clover, and where a Summer soil-improving plant is required, Cow Peas will fill all requirements.

GROW "GARAWI" SUDAN GRASS FOR SUMMER HAY

SUBTERRANEAN CLOVER

(*Trifolium Subterraneum*).

Subterranean Clover is an annual which, on account of its habit of re-seeding, is quite permanent when once established. The lower shoots force their seed pods into the soil in readiness for future propagation, from which characteristic the clover probably derives its name. The field may appear quite bare in the Summer but the seed in the soil comes away with the first Autumn rains, and in a week there is a dense growth where not a single plant was previously visible. The plants grow very close together, the stems crossing and over-lapping to a depth of several inches, the whole forming a dense mat. The crop dies down about the end of December, or early in January, leaving a mass of seed pods on the ground.

In the green state, Subterranean Clover is a succulent nitrogenous fodder, of which stock are extremely fond. Sheep and cattle keep it closely fed down, even when there is an abundance of natural pasture available. The lower stems, however, cling tenaciously to the ground, enabling the seed pods to penetrate the soil ready for the next season's crop, and thus preventing the plant from being eaten out. On account of its remarkable seeding capabilities and seed production, it spreads with great rapidity.

Once Subterranean Clover is firmly established, the initial seeding will last a lifetime. In this respect, Mr. P. F. Quinlan, Bostock's Creek, remarks (19/5/21):—

"I don't think it possible to ever get rid of Subterranean Clover when once established, but then it is too good a plant, and I never want to try."

UTILIZATION.—Subterranean Clover is not only valuable as pasturage for sheep and cattle, which are extremely fond of the plant, but it possesses the additional advantage of helping to suppress weeds, and where the weeds are thickest, forces itself amongst them and sends them to the right-about in "double quick time." (See the section, "As a Weed Killer," page 51.) Subterranean Clover is also particularly valuable for meadow or clover hay and cut when "just on the turn," makes the best of hay for dairy cows. As much as two tons of cured hay to the acre can be obtained.

The fattening qualities of Subterranean Clover, when cut with the seed fairly ripe, are remarkable, and at Mt. Barker, S.A., in 1920, bullocks fattened entirely on this plant, brought up to £35 per head when sold by auction. Even in the Summer, when the plants have died down and the fields are apparently bare, sheep and cattle will still get a considerable amount of feed from the residue of the dried stems and pods of the plant. It is also a great improver of land values.

CLIMATIC CONDITIONS.—Subterranean Clover is extremely hardy and wonderfully adaptable regarding climatic conditions, and although the ideal climate is one varying from temperate to medium cold, will give very fair results even in hot, dry districts with a fair rainfall. It is not a drought resister, but then its period of growth is from the first Autumn rains until the end of the year and it is dormant during the usual periods of drought. The climates of Gippsland, the Western District of Victoria, and the Mt. Barker district of South Australia are especially well suited to, and yield excellent results from this plant, which is also proving very promising in Tasmania, especially in the Midlands. It should also do well in New Zealand, and in fact in any country in the world of similar latitude, where the minimum rainfall is not below about 20 inches per annum.

Subterranean Clover is especially valuable in the Northern Areas of Victoria, where irrigation is available and is thoroughly recommended for inclusion in every "Permanent Pasture Mixture of Grasses and Clovers" laid down in those districts. In fact there is hardly any part of the State where it will not give at least fair results.

SUBTERRANEAN CLOVER. (Continued.)

SOIL REQUIREMENTS AND FERTILIZER.—The greatest value of Subterranean Clover is that it grows in practically any class of soil, but is especially valuable for dry, stony rises, whereon other pasture plants cannot be established, and in the Western District of Victoria, Subterranean Clover has converted acres of this class of previously sterile country into first-class sheep pasture land incidentally increasing its value by upwards of £5 per acre. It is essentially the plant for second-class land and dry hill country, but although especially valuable for these conditions, responds well to good treatment, and gives exceptionally good results on rich river flats.

Very little soil preparation is necessary, a rough harrowing being all that is required. Manure is not absolutely essential, although, on exceptionally poor ground, it is particularly beneficial in helping the plants to establish themselves more quickly. The fertiliser most generally used is from 84 to 112 lbs. of Superphosphate per acre, but in a wet Winter, the same quantity of Bone Dust gives more lasting results. A dressing of lime, although not absolutely necessary, except in very acid soil, is particularly valuable, as with all members of the Trifolium family.

Subterranean Clover repays with good interest a little initial outlay on lime and fertiliser.

SEED SOWING.—Seed of Subterranean Clover may be sown any time from the middle of March until early September. Although, when sown alone, as small a quantity as 2 lbs. of seed will sow an acre, as "the first cost is the only one" a more liberal seeding in the first place will ensure better and quicker results, while enabling the clover to establish itself more quickly. Once established, there is no need for re-sowing, and for this reason alone, the initial seeding should not be stinted; 5 lbs., 6 lbs., or even 7 lbs. of seed is not too much for an acre. When sowing the seed alone, mix with soil or sand, in order to ensure an even distribution.

Splendid results are obtained by sowing Subterranean Clover in mixtures, thus enabling the plants to establish themselves before being pastured too severely. In the Mt. Barker district, S.A., one successful grower, who sowed seed to get the plant started on his land, mixed 5 lbs. of Subterranean Clover with the usual quantity of Oats per acre, and sowed the mixture through the drill. The method was eventually very satisfactory, but it took over two years to get a good stand of the Clover.

Another grower in the same district got a splendid stand in the Spring following seeding by sowing 10 lbs. of Subterranean Clover mixed with 1½ bushels of Oats per acre.

Mr. John Le Couteur, Glen Albion, Cowley's Creek (10/5/21) writes:—

"I may first say in regard to Subterranean Clover—I first hand sowed Oats in a 2½-acre paddock, then harrowed the ground fine, then mixed the clover seed with Superphosphate, and put it in a seed drill lifting the disks and letting the seed and Superphosphate scatter on the surface. I then gave it a light harrowing, and will now roll it. Last year, I had some from you and sowed as above; it is now doing splendidly, and I am highly pleased with the results."

GENERAL TREATMENT.—To get a field established quickly, a thick seeding is essential, but it is necessary in any case to shut the paddock up from September during the first season after seeding, so as to allow the plants to seed, instead of grazing them too heavily.

When the Clover is sown in a mixture with oats or grasses for hay, the latter must be allowed to get fairly ripe before cutting. This allows the Clover a reasonable opportunity for seeding, but even so when cutting, it is advisable to leave a longer stubble than usual to make sure that the plants do deposit the seed in the ground. In subsequent seasons, these precautions are quite unnecessary.

FODDER CROPS FOR AUSTRALIA

SUBTERRANEAN CLOVER. (Continued.)

Cultivation is not absolutely necessary, although it is an advantage to run the cultivator through the paddock at the dead time. Subterranean Clover will do well under most unfavorable conditions and without fertiliser, but a top dressing in the Spring of from 84 to 112 lbs. of Superphosphate per acre either broadcasted or drilled, makes a wonderful difference, and the extra returns well repay any time and labor spent in this direction. Subterranean Clover is a plant that responds wonderfully to any generous treatment.

SUBTERRANEAN CLOVER AND BLOAT.—While Subterranean Clover like other plants will blow cattle, it cannot be classed as dangerous in this respect, and by using discretion and studying the circumstances peculiar to the district, any trouble may be completely obviated.

The experience of Mr. Bernard Stephenson, "Leicester," Mt. Barker, S.A., in this respect is appended:—

"As regards Subterranean Clover causing bloat, I have had cows in my paddocks ever since the clover was introduced into the district, and have never yet lost any through being "blown," and yet I have not taken any precaution to avoid it.

There is no doubt that it will bloat cattle, and I have known cases of it, but it is generally due to carelessness, such as when cows have been shut up all night, and then in the morning turned on to the dewy clover with empty bellies. The same would apply to Lucerne, and of the two I have always more fear of the Lucerne when turning the stock on it to graze. I think there is little danger of loss if the cattle are used to it. I have not heard of any case where sheep have been blown by Subterranean Clover, although I have also had sheep for years running on the pasture."

Mr. P. F. Quinlan, Bostock's Creek, 19/5/21, in answer to this question, replied, "No! Nothing to speak of," and there is no doubt that Subterranean Clover is less dangerous than most plants in this respect.

Mr. P. T. Neylon, Newminster Park, Camperdown, 4/4/21, writes:—

"I have not known stock to get bloat with Subterranean Clover, except cattle that have been starved or cows kept too long in the yard during milking. They are liable to get bloat on any rich grass."

AS A WEED ERADICATOR.—Owing to its luxuriant growth Subterranean Clover will check and suppress many weeds, and most people are not aware of the fact that it is most valuable in the eradication of noxious weeds. It has already been proved to be successful in overcoming and eradicating the poisonous Lobelia Weed in the Western District of Victoria, and in this respect **Mr. J. B. Clarke, Piggoreet West, 22/2/21 writes:—**

"It is suitable for all classes of soil, and is especially suitable for counteracting the poisonous effects of Lobelia Weed on the Western plains."

Mr. P. F. Neylon, Newminster Park, Camperdown, 4/4/21, writes:—

"I have found it permanent on rich chocolate soil, and have known it to eradicate Cape Weed on all soil. I have had no experience as yet with Lobelia Weed."

Mr. J. W. Crawley, Warrnambool, commenting on the statement that Subterranean Clover would eradicate Cape Weed, remarked:—

"This is not a bad performance if the verdict is correct. Subterranean Clover has not succeeded in beating the Cape Weed at our place, but still the stock "stand off" Cape Weed when there is anything better on the 'menu,' and this, of course, makes the contest one-sided. Subterranean Clover will 'do me' for all warm and early country."

In this respect it should be worth while making very thorough experiments with Subterranean Clover against St. John's Wort in the Bright district, as the Clover manifests all the characteristics of a suitable plant for successfully overcoming this noxious pest, and an experiment of this description need not be very costly.

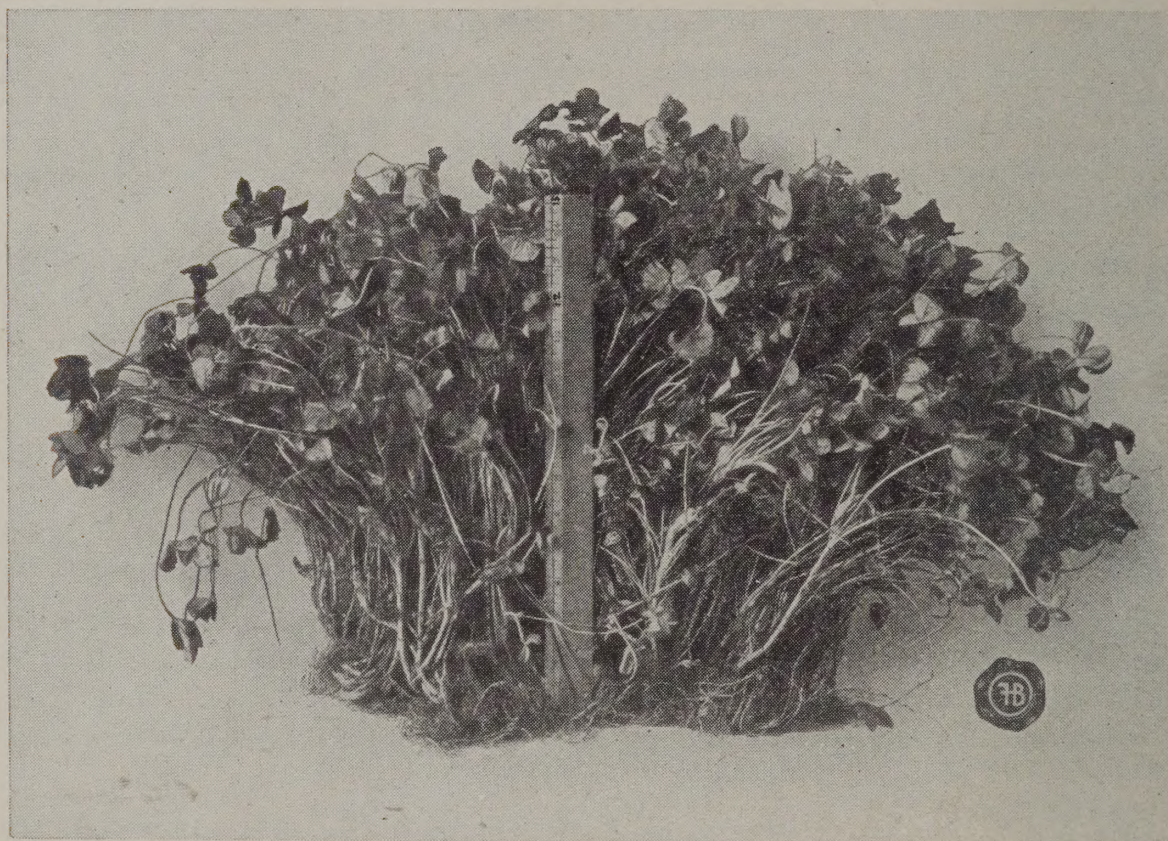
LIME YOUR LAND FOR CLOVERS. IT PAYS WELL

SUBTERRANEAN CLOVER. (Continued.)

AS AN IMPROVER OF LAND VALUES.—Subterranean Clover is undoubtedly a very valuable factor in improving the value of land, and especially in the Western District of Victoria have its qualities in this respect been demonstrated.

Messrs. Hendy, Leary & Co., of Geelong, consider that Subterranean Clover has improved their property at Moriac by upwards of £5 per acre, while the fact that the plant is most suitable for growing on poor hill land and second-class country combined with the high feeding value of its pasture for dairy cows, for market cattle, for sheep and for horses, is sufficient evidence of its great worth.

Subterranean Clover will grow on land whereon other grasses and clovers cannot be established, and the expression of Mr. F. Haycox:—"I consider one of its chief merits is that it will succeed where other Clovers have no chance," combined with its other valuable features very fully supports the claim of the writer **"THAT SUBTERRANEAN CLOVER IS A FIRST-CLASS BUSINESS PROPOSITION."**



Plants of Subterranean Clover in mid-July. The Field from which these Plants were taken was quite bare in March.

Mr. F. Haycox, Brookvale, East Gippsland, reports:—

"I have had Subterranean Clover established about six years, and have sown it always. I also drop a few seeds on uncultivated paddocks, and they germinate well and spread nicely. I do not find any trouble in establishing the plant, and once it is established, it is there for keeps. Its chief advantage or merit is that it will get a go on anywhere.

"It would be a great advantage to top-dress, but in my district the cost of freight is too much, about £9 per ton is the charge from Melbourne for Superphosphate, and that is what our ground needs mostly. It is, however, an advantage to run the cultivator through the Clover in the dead time, and this helps to made up for the deficiency of fertiliser.

"Subterranean Clover is like all other good Clovers, it has its niche the same as the others. I consider one of its chief merits is that it will succeed where other Clovers have no chance, and while on good land the other Clovers would lose it, it is particularly good for dry sandy and gravelly natured country."

FODDER CROPS FOR AUSTRALIA

SUBTERRANEAN CLOVER. (Continued.)

The following reports regarding Subterranean Clover from practical farmer will be of interest:—

Mr. J. Clarke, Piggoreet West, in reply to queries made, wrote (21/2/21) "I sowed the seed of Subterranean Clover after giving the ground an ordinary grass seed preparation. No fertiliser was used at the time of sowing, and the Clover has not since been top-dressed. I do not consider Subterranean Clover an expensive plant to establish. It is thoroughly permanent, and can be recommended as a good business proposition for second-class country."

"I sowed per acre $\frac{1}{2}$ lb. of seed mixed with other grasses. The best way to establish Subterranean Clover is to sow a light seeding with the last crop, and to then spell the paddock until the Clover has seeded."

"It is suitable for all classes of soil, and is especially valuable for counter-acting the poisonous effects of Lobelia Weed on the Western Plains."

"It can be sown with good results with a drill on ordinary grass land before the first Autumn rains, providing the ground is friable. Cattle are particularly fond of Subterranean Clover, and it spreads rapidly from droppings."

In a personal interview, 19/5/21, **Mr. P. F. Quinlan, Bostock's Creek**, expressed the following opinions regarding Subterranean Clover:—

"Subterranean Clover is absolutely permanent, and I never have to re-sow. I don't think it possible to ever get rid of Subterranean Clover once established, but then it is too good a plant, and I never want to try. It has always been on the property to my knowledge, and for at least 30 years, and my experience is that it could be cultivated for years and plants would still come away each Autumn."

"Subterranean Clover is the plant for second-class country, the others, such as "TARWEI" Strawberry Clover, White Clover, Red Clover, and Alsike, being better for rich land. It is a first-class feed for horses, dairy cows, and sheep, as well as for fattening cattle for market, and I have never known it to cause bloat."

"I never top-dressed until recent years, but I consider it well worth while, and will continue to do so in future."

"It is a great soil improver, and there are areas of poor country in our district (between Cobden and Camperdown) on which it was impossible to dairy some years ago. This land has been revolutionized, and increased over 100 per cent. in value through being dressed with Superphosphate and sown down with Subterranean Clover, and is now excellent grazing country."

WHY YOU SHOULD PLANT SUBTERRANEAN CLOVER

1. ALTHOUGH AN ANNUAL, IT RESEEDS ITSELF EVERY YEAR, AND ONLY REQUIRES TO BE SOWN ONCE IN A LIFETIME.
2. ONCE ESTABLISHED, IS THOROUGHLY PERMANENT AND STARTS AGAIN EACH YEAR IN THE AUTUMN.
3. YIELDS A LARGE AMOUNT OF PALATABLE PASTURE GREATLY RELISHED BY SHEEP AND CATTLE.
4. SHEEP AND CATTLE WILL SUBSIST THROUGH THE SUMMER ON RESIDUE OF STEMS AND SEED PODS.
5. MAKES VALUABLE MEADOW OR CLOVER HAY FOR DAIRY COWS.
6. IT IS A NITROGENOUS AND SOIL-IMPROVING PLANT.
7. ONCE SOWN, NEEDS NO CULTIVATION WHATEVER.
8. IS MOST VALUABLE IN THE SUPPRESSION OF NOXIOUS WEEDS.
9. GROWS WELL ON DRY, GRAVELLY GROUND, AND ESPECIALLY ON STONY RISES WHERE OTHER PASTURE PLANTS WILL NOT THRIVE.
10. DOUBLES AND TREBLES THE CARRYING CAPACITY OF POOR AND MEDIUM QUALITY LAND.

SUBTERRANEAN CLOVER RE-SEEDS ITSELF EACH YEAR

SWEET OR BOKHARA CLOVER

(*Melilotus Alba* or *Leucantha*).

Sweet or Bokhara Clover is one of the oldest of known plants, and appears to have originated in North-West India and in Central or Western Asia. The alternative name, "Bokhara Clover," has evidently been derived from the fact that this plant is supposed to have originally appeared at Bokhara in Turkestan. This country consists principally of desert and mountain ranges, devoted largely to the raising of goats, sheep and cattle, and possesses a climate of unusual severity, being extremely cold in Winter, and very hot, with droughty conditions in Summer.

Sweet Clover is a biennial plant with white flowers, which grows from 3 to 4 feet high the first year and from 6 to 7 feet the second season, when it reaches maturity. It is quite distinct from the King Island Melilot or Indian Sweet Clover (botanically *Melilotus Indica* or *Parviflora*), which is only an annual variety suitable for poor quality sandy land near the sea coast where better class fodder plants such as Sweet Clover, Lucerne, etc., will not thrive.

UTILIZATION.—Sweet Clover may be utilized for fodder, either as pasture, hay or ensilage, and when properly handled, will with the possible exception of Lucerne, furnish as much nutritious pasture from early Spring to late Autumn as most leguminous plants, while it has the further advantage that it does not cause "bloat." Although not quite as palatable as Lucerne, stock soon become accustomed to Sweet Clover and will eat it readily. Chemical analysis shows that Sweet Clover has an equally high food value both as forage and as hay as Lucerne, and contains a very much higher percentage of digestible protein.

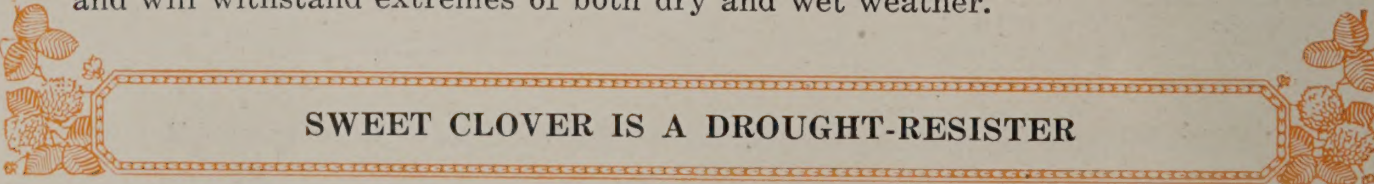
In addition, it is one of the best soil-improving crops that can be grown. When cut for hay, the stubble and roots remain in the ground and when the uneaten parts of the plants, together with the manure made while the animals are grazing, are added to the land and benefit the succeeding crops, and in common with all legumes, in addition to humus, Sweet Clover adds nitrogen to the soil.

Sweet Clover is also a very valuable honey plant, and in this respect will be of interest to apiarists, as it produces nectar over a very long period.

CLIMATIC REQUIREMENTS.—Sweet or Bokhara Clover is extremely hardy and will thrive in practically all parts of Australia where agriculture can be pursued, while its ability to withstand severe drought enables it to establish itself in dry districts with a total rainfall of less than 11 inches per annum, where other crops cannot be grown without irrigation.

The plant has been successfully grown in Southern Tasmania, in Victoria, in South Australia, in New South Wales and in Queensland, so that it will be realised that there are few parts of the Australian continent where it cannot be utilized in some way or another.

DROUGHT ENDURANCE.—Sweet Clover will resist drought better than any of the other Clovers or Lucerne, and in districts with mild Winters such as the Goulburn Valley, Bamawm and Rochester areas, the Mallee, the Griffith and Yanco Irrigation Settlements in N.S.W., and the River Murray Settlements in South Australia, where the seed can be planted in the Autumn, Sweet Clover is thoroughly established by the following Spring, and will not be injured by a prolonged dry spell, while as soon as the Autumn rains come in, the plants immediately make vigorous growth. One remarkable point about this plant is, while it will absorb very heavy rainfall, it is able to successfully resist severe drought. It must be remembered in common with all drought-resistant plants, that the young seedlings are very tender until the plants are established and growing steadily, after which they are quite hardy and will withstand extremes of both dry and wet weather.



SWEET CLOVER IS A DROUGHT-RESISTER

SWEET CLOVER. (Continued.)

SOIL REQUIREMENTS.—Like many other legumes, to secure the maximum results, Sweet Clover requires soil containing an abundance of limestone and providing lime is present, it will grow on all classes of ground. The plants will thrive on new exposed, heavy, clayey soils and on steep embankments where little else will grow, and Sweet Clover is more tolerant of poor drainage, overflow and seepage conditions than Lucerne. In irrigation areas, especially where the reservoir is in use, many acres of land are likely to become useless for Lucerne because of the rising of the water, and on such areas Sweet Clover will make vigorous growth. The maximum results, however, can only be expected on well drained soils. On land not sufficiently fertile to grow Red Clover or Lucerne, Sweet Clover will do well, and it is on these soils that it will prove most valuable.

Like many other Clovers, it makes its best growth on fertile soils rich in calcium carbonate (limestone country), although it will make sufficient growth on poor soils that are not acid, to justify planting. Many hill pastures may profitably be sown with Sweet Clover; it will not only make a valuable addition to the forage, but will improve the soil so that later on grasses will grow more abundantly.

WHY YOU SHOULD PLANT SWEET OR BOKHARA CLOVER

1. CAN BE PASTURED, CUT FOR GREEN FEED, OR MADE INTO HAY.
2. SWEET CLOVER MAKES FIRST CLASS ENSILAGE.
3. UNEQUALLED FOR RESTORING WORN OUT LAND.
4. THE GREATEST SOIL IMPROVING PLANT EVER INTRODUCED.
5. ADDS NITROGEN AND HUMUS TO THE SOIL.
6. PREPARES THE LAND FOR AND IMPROVES SUCCEEDING CROPS OF LUCERNE AND PASTURE GRASSES.
7. VALUABLE FOR EARLY SPRING FODDER.
8. BEING DROUGHT RESISTANT IS A USEFUL PLANT IN DRY SEASONS.

SOIL PREPARATION.—Sweet Clover will grow luxuriantly in many waste places and on uncultivated land, but nevertheless if the greatest success is to be attained, the same care must be used in the preparation of the seed bed, the selection of the seed, and the actual sowing, as with Lucerne. Sweet Clover requires a well settled and firm seed bed with just sufficient loose soil on the surface to permit of the seed being well covered. Too loose a seed bed is however liable to result in failure.

Providing there is plenty of moisture in the ground to germinate the seed and to keep the young plants growing, Sweet Clover seed will grow successfully broadcasted on sandy soil and scratched in with a harrow, but it must be remembered that young Sweet Clover plants are not drought-resistant, and that every precaution should be taken in seasons of drought or on land which dry weather affects badly to so prepare the seed bed that the largest quantity of moisture will be conserved, and the plants given an opportunity of thoroughly establishing themselves, after which droughts will not affect them.

As the seed is enveloped in a gelatinous covering, in order to increase the percentage of germination, it is advisable, unless there is abundant soil moisture at time of sowing, to soak the seed in clean water for from 12 to 18 hours before sowing.

SWEET CLOVER. (Continued.)

WHEN AND HOW TO SOW THE SEED.—The period for sowing Lucerne in any particular district applies equally to the time of seeding Sweet Clover. Where dry Summers and mild Winters are the usual conditions, Autumn seeding would be the most suitable, or the seed could be sown in the late Winter so as to get it established as early as possible before the dry weather comes in. In districts with a fair Summer rainfall but with a more severe Winter such as Gippsland and the Western District of Victoria, late Winter or early Spring sowing will be the most satisfactory.

The method used for seeding Lucerne apply equally to Sweet Clover, and seed can be either broadcasted or sown with a grain drill. Do not cover the seed too deeply, although the depth of planting may vary according to the class of soil, its mechanical condition, and the amount of moisture present. In rather heavy soils with a well pulverised surface, half an inch will be deep enough, but in a coarse seed bed with dry sandy soil and under dry conditions, the seed must be covered one inch or more. When the seed has been covered, roll to smooth and firm the surface of the soil, as well as to facilitate germination by bringing the soil particles which hold the moisture in closer contact with the seed. **THIS ROLLING AFTER SEEDING IS IMPERATIVE.**

From 8 to 10 lbs. broadcasted, or from 4 to 5 lbs. sown in drills 9 to 10 inches apart will be an ample seeding per acre. In very dry districts an even lesser seeding in wider rows is advisable to permit of each plant having a wider area of ground to draw on for soil moisture and supplementing this by frequent cultivation.

"SATISFIED WITH SWEET CLOVER."

Messrs. F. H. Brunning Pty. Ltd.,
Melbourne.

"Glen Lyon,"
Swift's Creek, via Bruthen.

"I tried a small quantity of your Sweet Clover some little time ago, and it grows here wonderfully well. I intend getting some more seed for next Spring if I can get a paddock ready for it."

(Signed) JOHN T. DYER, 27/1/21.

SUBSEQUENT TREATMENT.—No special treatment is required for Sweet Clover the first season; where sown in drills, cultivate regularly to destroy the weeds which are liable to choke out the young seedlings. When the plants are about 8 to 10 inches high, the pasture can be grazed, but stock must not be allowed to eat the young Clover down too closely, and especially during the Summer should close feeding be avoided as this retards root development. In dry districts where irrigation is not available, frequent cultivation will also be necessary to conserve the soil moisture.

When sown broadcast it is usually necessary to mow the plants when about 8 to 10 inches high to destroy the weeds, or stock may be turned in and the field lightly grazed. This condition is most likely to arise during a wet season, and in the late Spring or early Summer. When thoroughly established Sweet Clover may be grazed on throughout the Summer and Autumn, and if the pasturing is not enough to keep the young plants back sufficiently and prevent them from becoming woody, it is advisable to take a cutting of hay when the growth ceases in the late Autumn. As Sweet Clover is quite hardy, it is not necessary to allow any considerable top growth to remain on the plants for protection through the Winter.

During the second season, owing to the early Spring growth of Sweet Clover, it will be possible in warm districts to secure two crops of hay and one of seed, or the crop may be pastured through the entire season, and if not grazed too heavily will re-seed itself for succeeding years. It must be remembered, however, that after seeding, the plants die whether it be the first or the last growth of the second season that is allowed to go to maturity. During the second season it is very necessary to keep sufficient stock on the field to prevent the plants from becoming woody, but when it is intended to retain Sweet Clover permanently, stock must be removed from the pasture at least 8 weeks before frost is expected, so as to give the plants an opportunity of maturing and forming seed.




ROLL THE GROUND AFTER SOWING SWEET CLOVER

FODDER CROPS FOR AUSTRALIA

SWEET CLOVER. (Continued.)

FOR HAY.—Like Lucerne, Sweet Clover must be cut at the proper time, otherwise it becomes too woody and stemmy to make first-class hay. The first season's growth of Sweet Clover does not get coarse and woody, and may therefore be cut at its maximum growth in the Autumn. Where there is a chance of securing more than one crop during the season, the first crop should be cut when the plants are about 20 inches high. The time for making the first cut the second season will vary according to district; it depends on the rainfall, the fertility of the soil, and the climatic conditions generally, but in no case should the plants be permitted to flower or become woody. On fertile soil, well limed, a very rapid growth is made in the Spring, and the plants will, if allowed, often run up to 5 feet in height before showing flower buds; the first crop must therefore be cut when the plants are not more than 24 inches high, especially if the best quality hay is desired and a second cutting expected.



Harvesting Sweet Clover for Hay.

Sweet Clover does not grow as rapidly on poor land as on good soil, and in the drier parts of this country, where irrigation is not available, the best results will be obtained by cutting the first crop when the plants are about 20 inches high, and before the flower buds appear.

Cut at the right time and properly cured Sweet Clover Hay is readily eaten by all classes of live stock, and being rich in easily digestible protein, growing stock gain weight on it quite equal to that gained by those fed on Lucerne hay. As a milk producer, both for quality and quantity, Sweet Clover hay is quite equal to that of the other legumes, and when cut during the first season of growth is fine stemmed and leafy, very much resembling that of Lucerne in general appearance.

AS A PASTURE CROP.—Sweet Clover furnishes excellent grazing for horses, sheep, cattle and pigs, and although live stock not previously fed on Sweet Clover may refuse to eat it at first, this distaste may be easily overcome by turning them on the pasture in the early Spring, as soon as the plants

SWEET CLOVER IS A VALUABLE HONEY PLANT

SWEET CLOVER. (Continued.)

start growth, and before other green feed has started. The stock soon become accustomed to it, and will then eat Sweet Clover in preference to other forage plants. A sufficient number of animals should be kept on the pasture to keep it eaten down, so that at all times there will be an abundance of fresh shoots for grazing purposes. **THERE IS NO DANGER WHATSOEVER OF "BLOAT" FROM PASTURING SWEET CLOVER.**

It is particularly useful for poor soils where other crops make but little growth, and as it may be pastured earlier in the Spring than many other plants, and thrives throughout the hot Summer months, it is a most valuable addition to the pastures of many farms. Ground that is too rough or too depleted for cultivation, or permanent pastures which have become thin and weedy, are greatly improved by drilling in a few pounds of Sweet Clover per acre after disking, and the growth of the grasses will be improved by the addition of the large quantities of humus and nitrogen to the soil.



A stand of Sweet Clover (*Melilotus alba*) at Cowra, N.S.W., after going through the great drought of 1918.

Where Sweet Clover has been sown two years in succession in separate paddocks, the one sown the first year may be pastured until the middle of the Summer when stock should be turned in on the later seeding. By handling in this manner, excellent grazing is provided throughout the Summer, and a hay or seed crop may also be harvested from a field seeded the previous season.

AS A HONEY PLANT.—Sweet or Bokhara Clover is one of the most valuable of honey plants, being particularly useful as the period of nectar secretion usually follows that of White and Alsike Clover, and consequently comes at a time when the swarms are strong enough to get the full benefit of the secretion. The honey from White Sweet Clover is white in color with a slight greenish tint; the flavor is mild and suggestive of vanilla. Wherever Sweet Clover is grown either for fodder or for seed, bee-keeping can be recommended as a valuable source of additional income, while such localities are especially suitable for extensive commercial bee-keeping.

SWEET CLOVER. (Continued.)

AS A SOIL IMPROVING PLANT.—As already stated, Sweet Clover will make good growth on soils too depleted of humus for profitable crop production, and in addition to yielding a considerable quantity of forage on such soils, it adds a large quantity of humus to them. The big fleshy roots and the extensive root system of Sweet Clover plants do much towards breaking up the subsoil and providing better aeration and drainage. The effect of this is very often noticeable in the Spring, when land on which Sweet Clover has been grown for some years previously, will be in a condition to plow earlier than adjacent fields where it has not been grown. At a depth of 3 feet, the roots are often one-eighth of an inch in diameter, and they decay in from 5 to 8 weeks after the plant dies when the holes made by the roots are left partly filled with a fibrous substance, which permits of rapid and effective soil drainage.

Not only does Sweet Clover add organic matter to the soil, but it has in common with other legumes, the power of fixing atmospheric nitrogen by means of the nitrogen gathering bacteria in the nodules at the roots.

ADVANTAGES OF SWEET OR BOKHARA CLOVER (*Melilotus alba*)

Consider the following facts regarding Sweet Clover:—Will any other plant do as much, or can any other plant show such hardiness and adaptability?

1. It is not a weed, but a useful and valuable plant.
2. Like Lucerne, it is rich in protein.
3. Will not bloat cattle or sheep.
4. Equal to Lucerne for pasture.
5. It is a great milk producer.
6. Furnishes early Spring pasture.
7. Contains more protein than Red Clover.
8. Fits well in the crop rotation.
9. Is a great soil enriching crop.
10. Better than any of the common clovers for plowing in for green manure.
11. Is a valuable plant for honey bees
12. Prepares the soil for Lucerne.
13. Roots are soft and give no trouble in plowing.
14. Roots being tender become inoculated more readily than Lucerne.
15. Never damages cultivated crops.
16. Its roots decay rapidly, adding much nitrogen and humus to the soil
17. Grows and will produce a crop in practically all parts of Australia.
18. Sweet Clover prevents erosion.
19. Will grow on land too low, too wet, or too alkaline for Lucerne.
20. Thrives on land too hard and compact for Lucerne.
21. Grows well on land too poor for Lucerne, especially where there is lime.
22. Will give a cutting of hay and a seed crop in the one season.
23. Withstands frosts and extreme cold as well as hot, dry weather and drought.

KING ISLAND MELILOT

(*Melilotus Indica* or *Parviflora*.)

King Island Melilot (*Melilotus Indica* or *Parviflora*) is a yellow flowered annual which blooms and bears seed the first year and dies out about the middle of the Summer. This variety is very often erroneously described as *Melilotus Officinalis*, but the true *Melilotus Officinalis* is a biennial and a superior plant in every way. King Island Melilot is also known as Hexham Scent, Sour Clover and Stink Clover. The plant is only of use on poor quality ground and sandy wastes near the seashore, and should on no account be grown inland or on ground where the better class fodder plants can be successfully cultivated. In order to be palatable to stock, King Island Melilot must get the sea air, and when grown inland is practically only a weed. On account of the very high proportion of cumarin it contains, King Island Melilot is liable to taint milk and butter, except when grown near the sea coast.

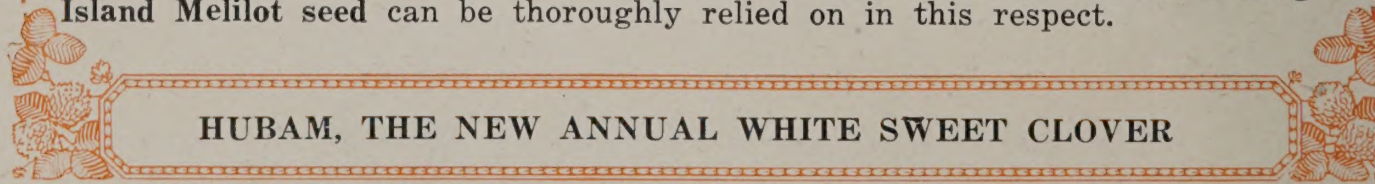
The plant is most suitable for cattle, but sheep will also fatten on it; it is not very palatable to horses, and they are not keen on it, unless there is no other fodder available. King Island Melilot enriches the soil, as being a legume it absorbs the nitrogen from the atmosphere and puts it into the soil through the bacteria nodules at its roots. Through its wonderful value as a soil improver for poor, sandy waste land, King Island Melilot has gained a great reputation. On both King Island and Flinders Island in Tasmania, this plant has transformed many useless areas into first-class grazing land completely changing the character of the soil and increasing land values over 100% in the course of a few years. The plant has also given wonderful results in this State, especially in the Werribee and Rye districts, and at Rye has converted almost pure sand into land that is now carrying a fair stand of Lucerne.

The Value of a Guarantee is not what is said but who says it.

SOIL PREPARATION AND SEED SOWING.—To get the best results from King Island Melilot, the ground must contain a good proportion of Lime. Where possible a thorough soil preparation is always repaid; the general method of seeding on loose, sandy ground, or loamy country, is to get a good burn on bracken fern or scrub land, and to sow the seed in the ashes. Land with a hard surface or fern mat needs to be disk harrowed.

King Island Melilot seed is covered with a waxy secretion, and as this has to be removed before germination can take place, it is necessary either to soak the seed in boiling water for at least 12 hours prior to sowing, or to sow after a fire. A good method is to cut down a portion of the scrub which provides dry material to carry a fire through the balance, and to broadcast the seed immediately after the fire at the rate of about 15 lbs. to the acre. The heat from the fire will melt the coating around the seed, and enable it to make rapid germination after the first rains. When sowing on already cleared land, it is necessary to treat with boiling water as previously advised. Unsoaked seed sown on ground that has not been heated by a fire is liable to remain in the land for two or three years, and many cases of non-germination of King Island Melilot can be traced to this cause. Experiences show that untreated seed sown in cold land will give little or no germination, and the removal of the waxy secretion, either by boiling water or other heat, is an essential preliminary to obtaining a successful stand of King Island Melilot.

Seed may be sown from March to June, broadcasted at the rate of 15 lbs. per acre; the earlier the sowing the greater the time for growth and the more valuable the crop when ploughed under for green manure. King Island Melilot seed is often very dirty, and in order to prevent the introduction of weeds into the ground it is advisable to only use seed that has been thoroughly re-cleaned, and Brunning's Special Machine-dressed King Island Melilot seed can be thoroughly relied on in this respect.



HUBAM, THE NEW ANNUAL WHITE SWEET CLOVER

FODDER CROPS FOR AUSTRALIA

KING ISLAND MELILOT. (Continued.)

GENERAL TREATMENT.—When the seed has been treated as recommended, germination is rapid and effective. The plant can either be grazed, cut for green feed, or made into hay, and if desired, the last growth can be reserved for ploughing under for green manure. While not suitable for growing inland as a fodder crop, King Island Melilot does particularly well at Mildura, and should be useful for many parts of Victoria as an orchard cover crop. Grown inland, the cumarin seems to be in greater proportion, and the plants have a very strong odor, which is a sure sign that it would taint both the milk and meat of animals fed on it.

If necessary, the crop can be ploughed under in the early Spring in sufficient time to prepare the ground for a Summer fodder crop, such as Sudan Grass, Cow Peas, Maize, etc. It is advisable not to graze King Island Melilot the first season until early July, but thence onwards the crop can be pastured right up to January or February, unless it is desired to save a seed crop, in which case shut the paddock up about the beginning of October.

VARIETIES OF MELILOTUS.

The varieties of Melilotus most general in commerce number four:—

1. *Melilotus alba* or *leucantha* (Sweet or Bokhara Clover).
2. *Melilotus officinalis* or *arvensis* (Yellow Biennial Sweet Clover).
3. *Melilotus parviflora* or *indica* (King Island Melilot).
4. Hubam (the new annual White Sweet Clover).

Nos. 1 and 3 are dealt with fully in this booklet, No. 2 is useful under certain conditions and is much superior to King Island Melilot whilst it is not of the same value as a fodder plant as Sweet Clover. Hubam, the new annual White Sweet Clover, is a recent introduction, and in the U.S.A. is proving a plant of very high value. Some notes on "HUBAM" appear on page 94, and should this plant be proved of value for Australian conditions, it is the intention of Messrs. F. H. Brunning Pty. Ltd. to introduce it in the Spring of 1922.

King Island Melilot, in its younger stages will under favorable conditions attain a height of from 4 to 6 feet, but as it becomes exceedingly coarse and woody in the stems, it is not good policy to allow it to develop on such lines, and especially where a good seed crop is desired, it will be found advantageous to feed it down when from 18 to 21 inches high. In the case of scrub or only partially cleared country, it is better not to graze during the first year, so as to grow as much stalk as possible by February, in order that the crop will carry a good fire, which is intended for two purposes. In the first place, the fire consumes the greater proportion of the remaining scrub, and secondly, as by this time the seed should have fallen on the ground, it serves to melt the waxy secretion and to thus promote effective germination of this seed, which is to provide the crop for the second season. A fire during the second year will practically clear the balance of the scrub, while the third year's burning will, in most cases, leave the land absolutely clear, and as by this time the soil should be sufficiently transformed by the Melilot, it will then be possible to sow down with either Lucerne or some of the better class Grasses and Clovers. It takes from 3 to 4 years for King Island Melilot to do its work. A good idea the third year is to sow Cocksfoot and Yorkshire Fog Grass with the King Island Melilot, as when the latter is dead, the two former are green owing to having been sheltered by the Melilot. The latter, by absorbing the nitrogen from the atmosphere, is enriching the land and taking the place of the other Clovers, while there will be a fine growth of Cocksfoot and Yorkshire Fog in the Summer, when the Melilot has dried off. The proportions are 10 lbs. of best quality M/D Cocksfoot, 10 of M/D Yorkshire Fog Grass, and 10 lbs. of King Island Melilot, a total of 30 lbs. per acre.

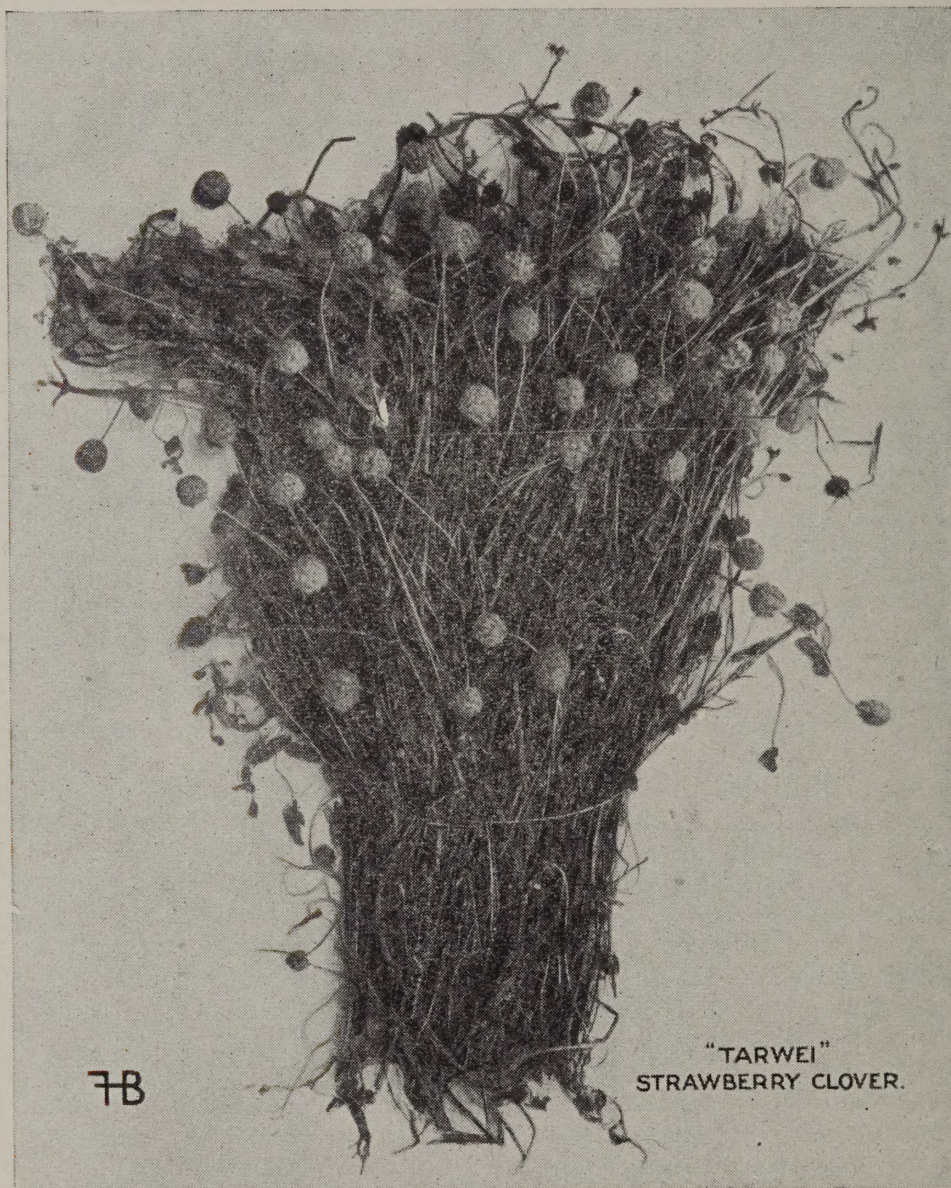
USE KING IS. MELILOT FOR POOR LAND NEAR THE SEA

STRAWBERRY CLOVER

(*Trifolium fragiferum* var *Tarwei*).

Brunning's "TARWEI" Variety.

"Tarwei" Strawberry Clover is a perennial plant, with spreading stems, pink flowers, and foliage somewhat similar to White Dutch Clover. The name has been derived from the fact that the seed heads very much resemble the fruiting Strawberry in appearance, and there is also a further similarity, inasmuch as the Clover throws out runners and roots as it goes along, thus establishing itself very quickly.



Brunning's "Tarwei" Strawberry Clover, showing the seed heads, whence the plant derives its name.

The plant is particularly valuable for swamps and wet, marshy, heavy ground, especially within 50 miles of the seacoast, and is unequalled for such conditions. On this class of land as a general rule only inferior swamp grasses and reeds of little or no fodder value can be grown successfully, and it is there that "Tarwei" Strawberry Clover so emphatically improves land values by converting such country into high-class grazing land, yielding excellent pasture.

AN IMPROVER OF LAND VALUES. SEE PAGE 77

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

"Tarwei" Strawberry Clover is not only suitable for inferior swamp country but yields excellent results on black, loamy, heavy land as well as on moist, heavy, rich river flats. Rye Grass, Cocksfoot, Lucerne and other Grasses and Clovers might also be successfully grown under such favorable soil conditions, but "Tarwei" Strawberry Clover will outyield them all, and having a higher feeding value must necessarily recommend itself as a good business proposition.

Owing to its permanency when once established and its habit of propagating itself by its creeping roots as well as by re-seeding, with reasonable attention where necessary, "Tarwei" Strawberry Clover pastures may be regarded as everlasting. (See No. 6 on page 75 re permanency of Strawberry Clover).

UTILIZATION.—Primarily "Tarwei" Strawberry Clover is a pasture plant, and is principally utilized for this purpose, but it also makes Clover hay of first-class quality, although when used in this way, it is better grown in mixture with other grasses or clovers.

IT INCREASES LAND VALUES BY INCREASING PRODUCTIVITY, and by converting land previously useless into first-class grazing country. In this respect, Mr. Caleb Barlow, North Devon, South Gippsland, writes:—

"One of my paddocks which had a spring was very boggy, and I was unable to walk on it myself. The following year, after sowing Strawberry Clover, it would carry stock safely, the roots were so thick and strong."

"Tarwei" Strawberry Clover is also particularly valuable for land liable to crack in Summer or for any cricket-infested ground, and owing to the fact that it remains green right through the Summer and Autumn, when the other grasses and clovers are dying off or are dormant, in addition to furnishing valuable feed during this period, **CAN BE REGARDED AS A SURE PREVENTATIVE OF GRASS FIRES.**

For dairying, as well as for fattening cattle for market, it is superior in feeding value to Rye Grass and Lucerne; it is an equally valuable and most palatable fodder for sheep, horses and pigs. "Tarwei" Strawberry Clover has a high value as a milk-producer, and many farmers in the Western District of Victoria rely solely on this plant for dairying.

AS A PASTURE PLANT.—Where soil and climatic conditions are congenial, this Clover is without doubt the best milk-producing and the best fattening plant that can be grown for grazing. The experience of growers (See No. 2 on page 72) testify to its value in both these respects.

"Tarwei" Strawberry Clover also furnishes excellent pasture for sheep, pigs and horses; sheep, however, must not be allowed to graze on it too long owing to their habit of biting the plants too close to the roots. This has a tendency to check the Clover, and where sheep are allowed to graze on it continually without a spell, the plants do not get a chance and are liable to be eaten out. Nevertheless, this is an excellent testimonial to its palatability.

Mr. C. Larsen, Carlisle River (12/7/21) remarked in course of a conversation regarding this Clover:—

"Where conditions suit Strawberry Clover, it is the finest pasture plant I know."

AS AN IMPROVER OF LAND VALUES.—The best evidence of Strawberry Clover as an improver of land values will be the experience of practical men appearing on pages 77 to 79, under the heading of No. 8. **"TO WHAT EXTENT DOES STRAWBERRY CLOVER IMPROVE THE VALUE OF LAND."** If only on account of replacing Barley Grass in the Summer, and because it provides such excellent pasture during the late Summer and Autumn, when the other Grasses and Clovers have died off, thus increasing the stock carrying capacity of the land, would "Tarwei" Strawberry Clover be worth growing, but this is only a single example of its many good features, and is merely quoted to show one of the several ways in which the plant improves the utility, and consequently, the value of the land.

READ THE NOTES ON HUBAM, PAGES 61 AND 94

STRAWBERRY CLOVER. (Continued.)

VARIETIES.—The true perennial “Tarwei” Strawberry Clover discussed in this booklet is the *Trifolium fragiferum*, and an extremely valuable plant.

Another Clover often erroneously termed “**ANNUAL STRAWBERRY CLOVER**” IS **PERSIAN CLOVER OR SHAFTI (TRIFOLIUM RESUPINATUM)**. It has a small pink flower somewhat similar in color to that of *Trifolium fragiferum*, and the seed heads, although not so large, are of the same globular shape, and retain the seeds in the same manner. *Trifolium resupinatum* has only a very slight pasture value, and dies down in the late Summer or Autumn just at the time feed is becoming scarce, and is most needed. “Tarwei” Strawberry Clover (*Trifolium fragiferum*), on the other hand, is green all the Summer and Autumn, and preserves the succession of or furnishes feed right through practically the whole year.

Another Clover suitable for moist country is **LOTUS MAJOR OR GREATER BIRDSFOOT TREFOIL**, but this plant is adapted to totally different conditions to “Tarwei” Strawberry Clover, and to aid in selecting the more suitable for this particular land, a comparison between these two Clovers, together with their suitability to certain conditions appear on page 80.

“TARWEI” SEED.—The “Tarwei” Shelled Seed is by far the most economical method of establishing the plant, and obviates the loss occasioned in the process of dehusking unshelled seed, as from 5 to 6 lbs. of average quality seed in husk is required to yield a pound of shelled seed. The process of shelling, unless carefully carried out, is liable to injure the germination of the seed, but this danger has been completely eliminated by Messrs. F. H. Brunning Pty. Ltd. for some years past, special machinery having been installed for the purpose.

Top-dressing is a payable investment with all Grasses and Clovers, especially with “Tarwei” Strawberry Clover.

BRUNNING’S “TARWEI” SHELLED STRAWBERRY CLOVER SEED can be relied on to be of first-class germination, and other conditions being reasonably suitable, will produce a satisfactory stand.

SOIL AND CLIMATIC CONDITIONS.—The plant is fairly adaptable as regards climatic conditions, and will under reasonably suitable conditions give splendid results in districts ranging from temperate to cold, but it requires moist heavy land to grow it to perfection. The home of “Tarwei” Strawberry Clover is on salty matured heavy ground, and the best returns will be secured near the seashore and up to 50 miles or so inland. On drained swamps of loamy and peaty character, on black heavy river flats, and for land liable to crack in the Summer it has no equal. The opinions of practical growers in these respects (see page 71, especially No. 1) are commended to the reader’s careful perusal.

Excellent results will be obtained on any damp low-lying heavy land, and “Tarwei” Strawberry Clover will stand being covered with flood water for a considerable period without suffering injury. (See No. 3 on page 73 for experience in this respect).

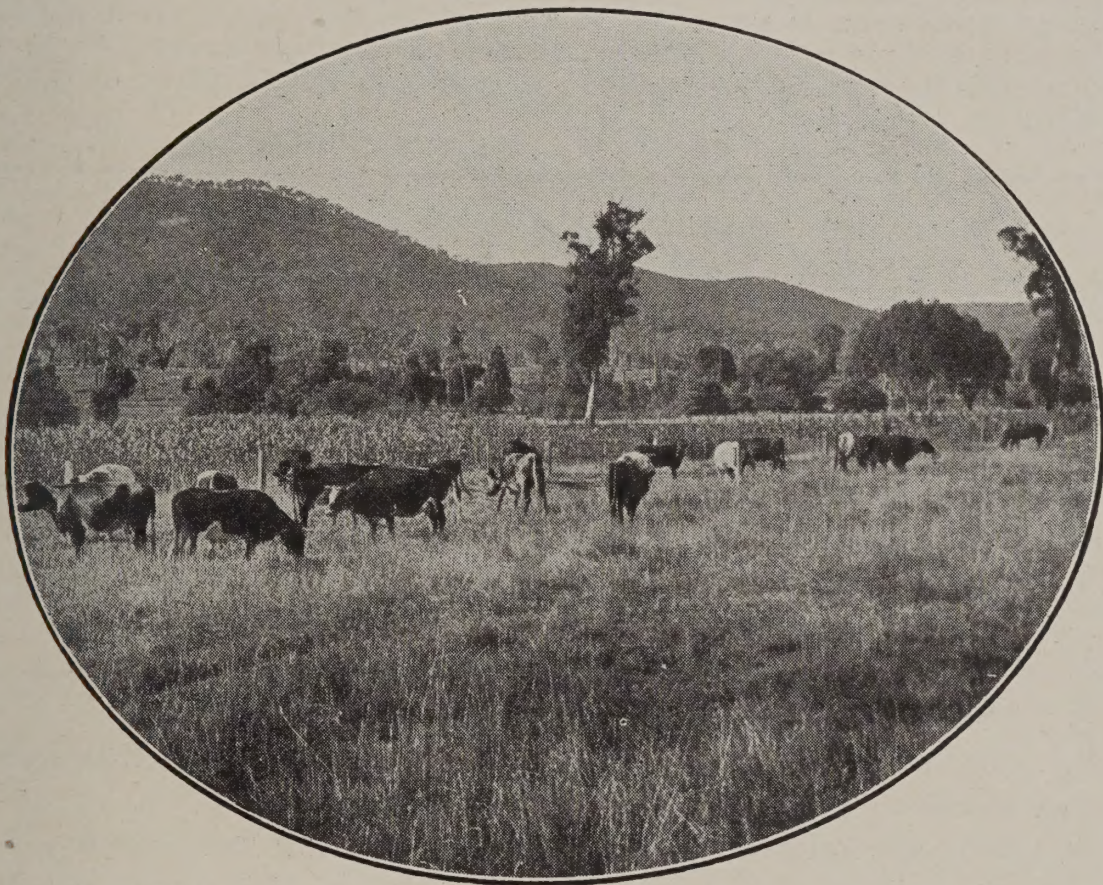
Soil preparation is not essential, but where conditions permit, the preparation of a first-class seed bed such as is required for Lucerne will be well repaid. The condition of land suitable to “Tarwei” Strawberry Clover in many instances precludes the possibility of any initial preparation of the ground. If, however, the tussocks can be cut and burnt, the seed will get a good start sown in the ashes. The remarks of Mr. Stanley Lowe, see “C” under No. 8 on page 77 are especially directed to the attention of the reader. The need of lime in the ground is a question on which there appears to be a considerable diversity of opinion, but it seems certain that where this element has not been applied either prior to seeding or at some subsequent stage, the soil must already contain a sufficient supply for the needs of the plants.

A PAYABLE INVESTMENT. SEE PAGES 119 TO 123.

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

SOWING THE SEED.—"Tarwei" Strawberry Clover seed may be sown at any time from the middle of March until early July, and in some moist districts, even up to the first week in August. The earlier the seed is sown, the longer the growing period available before the Summer, and the longer the plant has to establish itself before being called on to withstand the first period of hot weather, the better. "Tarwei" Strawberry Clover will not yield much pasture during the first season, and appears to be slow in establishing itself in the initial stages, but after the first Summer, grows rapidly and luxuriantly, year after year, and can be grazed for ten out of the twelve months of the year where not flooded in the Winter.



While at least from 10 to 12 lbs. of seed in husk is required to sow an acre, the economical and surer method of establishing the plant is to use **BRUNNING'S "TARWEI" SHELLED SEED**, of which, sown by itself, 2 lbs. per acre will be found ample. The seed is generally broadcasted, and to ensure an even distribution should be mixed with dry sand when sown alone.

In the past, there was always a certain amount of difficulty in establishing Strawberry Clover from seed, but since the **"TARWEI"** shelled seed has been available (during the past five or six years) this trouble has been completely overcome.

Mr. Caleb Barlow, North Devon, writes:—

"I never used any top-dressing of any kind, lime or otherwise, and I have had no trouble to grow Strawberry Clover. I did not even harrow the ground. I sow broadcast after a burn, and simply sow on top of the ashes with a mixture per acre of 10 lbs. of clean Ryegrass, 2 lbs. of Alsike, and 3 lbs. of Strawberry Clover. I have had good results from same, and always sow the seed in sand mixed well together."

After the seed has been sown a rolling, where possible, will do much towards facilitating germination and ensuring a good stand.

(See reports on page 75, No. 5, re establishing Strawberry Clover from the shelled seed.)

GENERAL TREATMENT.—Apart from a rolling (where possible) after sowing the seed, no further treatment is necessary, except possibly a dress-

SEE PAGE 94 RE THE NEW CLOVER "HUBAM"

STRAWBERRY CLOVER. (Continued.)

ing of lime or a top-dressing of Superphosphate every two or three years, and providing the paddock is judiciously managed, it will produce feed over a very lengthy period of the year, and in districts with congenial conditions, and not liable to flood, may be relied on for pasture for ten months of the year.

The plants seem to thrive from being kept eaten down, and one practical grower writes:—

“Strawberry Clover is thoroughly permanent if fed off well; I mean it will dwindle if left in an enclosure and not fed off.”

Strawberry Clover responds well (especially on medium-class land), to a top-dressing of Superphosphate or Bone Dust and Superphosphate mixed every two or three years. The first cost of the seed is practically the only one as no cultivation is necessary after seeding, and apart from a possible top-dressing of lime or of fertiliser as mentioned above every two or three years, no further treatment is needed to maintain the pastures in first-class condition.

WHY YOU SHOULD PLANT STRAWBERRY CLOVER

1. NOTHING BETTER FOR SWAMPY GROUND, BLACK HEAVY MOIST SOIL OR DAMP LAND.
2. ONCE ESTABLISHED, IS THOROUGHLY PERMANENT.
3. YIELDS ABUNDANCE OF FIRST-CLASS PASTURE.
4. A WONDERFUL MILK-PRODUCING PLANT.
5. MAKES GOOD QUALITY PALATABLE HAY.
6. EASILY ESTABLISHED FROM “TARWEI” SHELLED SEED.
7. INCREASED LAND VALUES BY UPWARDS OF 100%.
8. CONVERTS USELESS SWAMPS AND WASTE MARSHLAND INTO FIRST-CLASS GRAZING AREAS.
9. ONCE ESTABLISHED, REQUIRES NO FURTHER TREATMENT.

Strawberry Clover is, therefore, A **VERY CHEAP PLANT TO MAINTAIN**, an important consideration in these days of high labor costs. In the Tarwin district of South Gippsland, there are stands of Strawberry Clover that have been established over twenty-five years, and are still in splendid condition. This plant also does particularly well throughout the Western District of Victoria, especially on the Curdie's River flats, near Warrnambool, and around Port Fairy.

While it may not be absolutely necessary to top-dress or cultivate Strawberry Clover, there is no doubt that the plant does respond well to this treatment, and Mr. P. J. Fogarty, Mirbingah, Port Fairy, writes (18/5/21):—

“Last season (1920) I top-dressed, that being the first time, and now the Strawberry Clover is all over the paddock. Where top-dressing is carried out, the Clover does well. A small plot is said to have been sown here by one of the early farmers nearly 30 years ago, but it is only within the last 6 or 7 years that steps have been taken by the farmers here to cultivate the plant. My observation and experience show that proper attention by cultivation and top-dressing will repay any outlay. Cultivation is done either by disk, weighted harrows or scarifier in the late Autumn and Spring, top-dressing with up to 60 lbs. of Superphosphate in the Spring.”

Other instances could be given of this tendency for Clovers to take a prominent place in the grass land after an application of Superphosphate, and it can be safely accepted from general experience that Clover follows applica-

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

tions of Superphosphate even when the fertiliser is applied to land planted with Wheat, and subsequently left out to grass.

There is no doubt that the Clover responds well to a top-dressing of Superphosphate, and the following remarks from an article by the Senior Dairy Supervisor (Mr. J. S. McFadzean) appearing in a recent issue of the Journal of the Victorian Department of Agriculture will be of interest:—

"Last year, the dairy returns on the holding of Mr. J. S. Cook at Allestree, 6 miles from Portland, averaged £17 per head from butter fat for the whole herd of 24 cows.

"The most striking feature of the land in this locality is the abundance of Strawberry Clover. On Mr. Cook's farm it was first noticed about eight years ago, after an experimental top-dressing of Superphosphate had been given some grass land. Soon afterwards Strawberry Clover began to make good growth, showing strongly through the rougher grasses, which had previously covered the ground. As this top-dressing gave such good results, it was extended each year, until now a fair proportion of the grazing land of the farm has been treated, and its carrying capacity thereby greatly increased. From the way the Strawberry Clover developed here consequent on the land being top-dressed, it is evident that it must have been established for very many years, but had been unable to show out from among the coarser native grasses until stimulated by the Superphosphate dressing. After the application of the fertiliser, the Clover came on strongly, and is now growing thicker each year.

"No one appears to know anything of the introduction of Strawberry Clover into this district, but it is so very widely spread that its coming must date back to an early settlement, having been introduced by the pioneers of possibly the early 'Forties.' Once started, the plant would spread over a wide area through the seed being carried by stock and flood waters to ultimately show itself in its luxuriant abundance when clearing and cultivation had given the required conditions."

Where "Tarwei" Strawberry Clover is growing on land subject to flood, top-dressing with fertiliser would be quite unnecessary as the silt brought down by the flood waters supplies the necessary elements.

SUITABILITY FOR MIXTURES.—Where moisture conditions permit, "TARWEI" Strawberry Clover, old pasture Perennial Rye Grass, Creeping Bent and Alsike Clover, make one of the best permanent pasture mixtures that can be grown on damp heavy ground. Of this mixture 24½ lbs. of seed is ample for an acre and the various proportions are 20 lbs. Perennial Rye Grass, 3 lbs. Creeping Bent, 1 lb. "Tarwei" Shelled Strawberry Clover, and ½ lb. Alsike Clover.

Mr. Caleb Barlow reports that he obtains excellent results from a mixture consisting of 10 lbs. of Perennial Ryegrass, 2 lbs. of Alsike, and 3 lbs. of "Tarwei" Strawberry Clover per acre, while Perennial Ryegrass and "Tarwei" Strawberry Clover in mixture by themselves have proved very satisfactory, using 20 lbs. of the former and 1½ lbs. of the latter per acre.

"Tarwei" Strawberry Clover, being adapted to very wet conditions, even to the extent of being covered with flood water for a very lengthy period, it necessarily follows therefore that there are many cases in which excess moisture and still flood waters would, by prolonged submersion, kill out such plants as Perennial Ryegrass, Creeping Bent and Alsike, and under these conditions, the best grass to grow in mixture with "Tarwei" Strawberry Clover is *Paspalum Dilatatum*. Both these plants revel in wet conditions, and will withstand excessive moisture for a lengthy period, and while *Paspalum Dilatatum* is not of the same high fodder value as Ryegrass, or Creeping Bent, still it yields fairly palatable fodder, and growing without injury on low-lying land and withstanding excessive moisture, it is well adapted to the special conditions mentioned.

There is nothing better than "Tarwei" Strawberry Clover as a palatable and nutritious fodder for fattening cattle for market, as a milk producer for dairy cows or for grazing sheep or horses, but all animals require a certain amount of "roughage." *Paspalum Dilatatum* supplies this roughage, and in conjunction with "Tarwei" Strawberry Clover makes a splendidly balanced ration palatable to all stock.

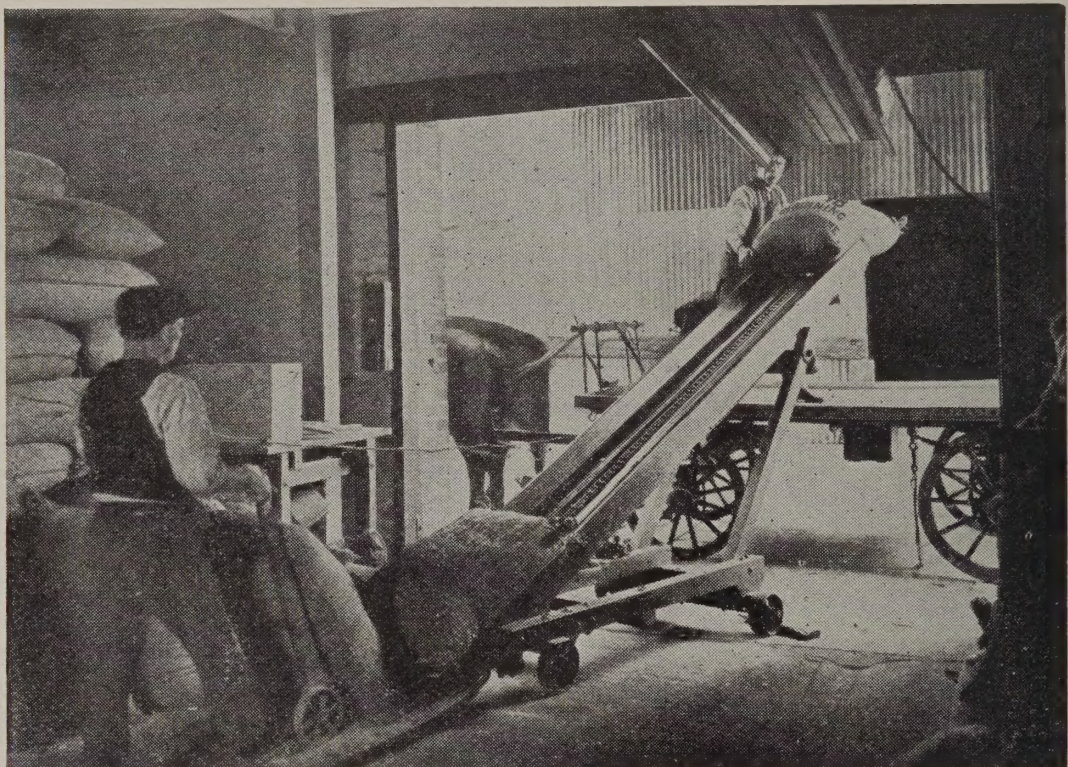
This mixture must be sown fairly thickly to get the best results, about 10 lbs. of Brunning's Best Quality, Hand-shaken *Paspalum Dilatatum* and 2 lbs. of "Tarwei" Shelled Strawberry Clover Seed being required per acre.

COW PEAS ARE A VALUABLE SUMMER LEGUME

STRAWBERRY CLOVER. (Continued.)

The best time for sowing is in the early Autumn, but unless the Paspalum Dilatatum is sown early and before the ground becomes cold, it is better to sow the "Tarwei" Strawberry Clover separately in May or June, and to follow with the Paspalum Dilatatum about early September.

This mixture of "Tarwei" Strawberry Clover and Paspalum Dilatatum IS **NOT RECOMMENDED** where moisture conditions permit Perennial Ryegrass or the other better grasses and clovers being grown with the Strawberry Clover.



Special Portable Loading Machine at Brunning's South Melbourne Bulk Store.

COMPARATIVE FEEDING VALUES.

The appended analyses, which were kindly submitted by the Government Botanist, show the comparative food values of "Tarwei" Strawberry Clover, Lucerne, Red Clover, Perennial Ryegrass, and Poa Aquatica, and as the reader will perceive, Strawberry Clover shows a considerably higher ratio both in protein content and carbohydrates than any of the others.

This is a further reason for laying down land with "Tarwei" Strawberry Clover, where soil and other conditions are congenial to the growth of the plant.

Plant.	Moisture.	Dry Matter.	Crude Protein.	Crude Fat.	Fibre.	Carbo-hydrates.	Mineral Matter.
	%	%	%	%	%	%	%
"Tarwei" Strawberry Clover ..	70.00	2.47	5.20	0.64	5.99	15.70	—
Lucerne	76.0	24.0	4.5	0.8	6.8	9.6	2.3
Red Clover	79.0	21.0	3.4	0.7	5.9	9.4	1.6
Perennial Ryegrass	70.0	30.0	3.6	1.0	10.6	12.8	2.0

Plant.	Water.	Ash.	Nitrogen Free Ext.	Fat.	Crude Fibre.	Albumi-noids.
Poa Aquatica . . .	14.30	6.26	48.64	1.89	21.94	6.97

STRAWBERRY CLOVER AND BLOAT.—The general experience is that the plant is not likely to blow stock except with cattle brought from poor country. Of course, any plant is liable to cause bloat, and if very hungry stock are placed on "Tarwei" Strawberry Clover and left too long, the consequences may be serious, especially as cattle, horses and sheep relish the plant so greatly. The danger is, however, very slight and "Tarwei" Strawberry Clover is far safer in this respect than Lucerne or Red Clover. (See No. 4 on page 74, for practical experiences).

FODDER CROPS FOR AUSTRALIA

SPECIAL FEATURES OF "TARWEI" STRAWBERRY CLOVER

1. THE BEST OF ALL PLANTS FOR MOIST HEAVY SOIL, SWAMPY GROUND AND MARSHY LAND.
2. IS A GREAT MILK PRODUCER—SUPERIOR IN THIS RESPECT TO LUCERNE.
3. UNEQUALLED FOR FATTENING CATTLE FOR MARKET.
4. AN EXCELLENT AND MOST PALATABLE FODDER FOR SHEEP, HORSES AND PIGS.
5. FURNISHES PASTURE PRACTICALLY THE WHOLE YEAR ROUND.
6. SUPPLIES LATE SUMMER AND AUTUMN FODDER WHEN OTHER GRASSES AND CLOVERS ARE DORMANT.
7. DOES NOT BLOAT CATTLE OR SHEEP.
8. RICHER IN PROTEIN CONTENT THAN LUCERNE OR RED CLOVER.
9. A GREAT FACTOR IN IMPROVING LAND VALUES BY INCREASING PRODUCTIVITY.
10. WILL GROW LUXURIANTLY ON LAND, TOO LOW, TOO WET, OR TOO ACID FOR RYEGRASS, COCKSFOOT, LUCERNE OR RED CLOVER.
11. EXTREMELY HARDY, WITHSTANDS FROSTS WELL AND FURNISHES GOOD PASTURE RIGHT THROUGH THE WINTER WHEN NOT FLOODED.
12. WILL STAND BEING COVERED WITH STILL FLOOD WATER WITHOUT INJURY FOR CONSIDERABLE PERIODS.
13. DELIGHTS IN HEAVY SALTY LAND AND RIVER FLATS NEAR THE SEA COAST, AND THRIVES IN THIS CLASS OF COUNTRY.
14. EXCEPTIONALLY VALUABLE FOR LAND THAT IS CRICKET-INFESTED OR LIABLE TO CRACK IN SUMMER.
15. VALUABLE FOR BINDING WASHOUTS AND PREVENTING LOW-LYING PLACES FROM WASHING BIGGER.
16. A PREVENTATIVE OF GRASS FIRES, BEING GREEN WHEN OTHER GRASSES AND CLOVERS ARE DYING OFF.
17. REPLACES BARLEY GRASS IN THE SUMMER, AND SUPPLIES NUTRITIOUS PASTURE IN LIEU THEREOF.

"GREEN BERSEEM SENT TO H.M.S. 'RENOWN' AS FODDER."

Messrs. F. H. Brunning Pty. Ltd.
MELBOURNE.

Tantallon,
MENZIES' CREEK,

11th August, 1921.

Dear Sirs,

In reference to your letter of the 23rd ult., I did not have a very large area of Berseem, and am sorry that I did not have several acres.

My first experience was last year, when I sowed the seed in early March, and it grew well all through the Winter, although ours is a pretty cold district. The Berseem made a beautiful Winter crop, was most satisfactory, and gave us quite five cuttings.

It may interest you to know that the Wallaby given to the Prince of Wales on his recent visit was very fond of the Clover, and we sent some small boxes of this green Berseem to the "Renown" as green feed for the animal. Even with the unfavorable season last year, I got splendid results from this Clover.

This season unfortunately, owing to the dry Autumn, the plant has not made such rapid progress, and is only now from 21 to 24 inches high, but under reasonable conditions, I consider that Berseem is an eminently satisfactory and first-class Winter fodder plant.

Yours faithfully, (Signed) P. M. DOUGLAS.

A Splendid Proposition for Northern District Farmers with Irrigation Facilities.

The reader is referred to pages 119 to 123 wherein appears a very full and complete article on Permanent Grass and Clover Pastures for the Northern Areas of Victoria.

This is an economical method of utilizing land unsuitable for Lucerne and other crops and a profitable investment as with irrigation these Grasses and Clovers establish themselves and not only increase the stock carrying capacity of the land, but by providing pasture practically the whole year round enable the Lucerne to be cut for hay and reserved for Winter use or sold when prices are high.

READ THE NOTES ON COW PEAS ON PAGES 20 TO 22

**KEY TO INDICATOR LETTERS FOR OPINIONS OF GROWERS
ON PAGES 71 TO 79.**

To obviate repetition and to economise in space, the names of the gentlemen whose opinions on Strawberry Clover appear on pages 71 to 79, are indicated by a key letter. As a guarantee of genuineness, the full names, addresses, and dates, are shown below.

- A. Mr. Chas. Gellion, Woodlands, Gelliondale, 10/3/21, 28/4/21.
- B. Mr. Caleb Barlow, North Devon, Sth. Gippsland, 3/4/21, 13/4/21, 29/4/21, 3/6/21.
- C. Mr. Stanley Lowe, Scott's Creek, 3/5/21, 14/6/21.
- D. Mr. W. Burleigh, Eumeralla, Macarthur, 8/4/21, 25/4/21, 23/6/21.
- E. Mr. J. Wm. Crawley, Moynevale, Warrnambool, 14/1/21, 25/4/21, 7/6/21, 13/6/21.
- F. Mr. S. A. Ross, Tarwin, 16/4/21.
- G. A. J. Walters, Kennedy's Creek, via Laver's Hill, 26/2/21, 7/5/21.
- H. J. McInnis, Eumeralla, Macarthur, 28/4/21.
- I. Dr. Haydon, Macarthur, 26/4/21.
- J. John Wright, Yambuk, via Port Fairy, 19/4/21, 7/6/21.



Jersey Cows on the property of Mrs. C. W. Busby, Westbury, Tasmania.

- K. William Cashin, Tarwin Lower, 16/4/21.
- L. E. H. Finck & Sons, Heywood, 21/3/21, 9/6/21.
- M. John Le Couteur, Glen Albion, Cowley's Creek, 14/5/21, 10/6/21.
- N. F. W. Grinter, Spring Farm, Kolara, via Terang, 26/5/21, 1/6/21.
- O. Mr. Stewart Lord, Port Campbell, 16/6/21.
- P. Mr. Archie Eastwood, Port Campbell Rd., Cobden, 18/6/21.
- Q. Mr. Fred Mills, Willow Meadows, Neerim North, 10/6/21.
- R. Mr. Harold Bisdee, Melton, Tasmania, 2/6/21.
- S. Alex. McDonald, Cowley's Creek, 23/6/21.
- T. Rowe Rros., Scott's Creek, 25/6/21.
- U. Mr. W. Baird, Sparrowvale Farm, Geelong, 1/7/21.

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

No. 1. Do You Consider Strawberry Clover Worth Growing on Swampy Ground and Damp Spots?

- A. Yes.
- B. Yes, nothing better.
- C. Yes, undoubtedly. The heavy black soil all along the Curdie's River, from the source to the mouth on the flats, is one mass of Strawberry Clover.
- D. I have now about 500 acres of Strawberry Clover, and am increasing the area as fast as I can by sowing seed and planting sods every year. It grows best on a rich, retentive soil, not deficient in lime, which retains the moisture well throughout the Summer, and if occasional floods inundate it for short periods, it will probably be benefited thereby.
- F. Yes.
- G. It is an excellent fodder on damp soil.
- H. Yes.
- I. Yes, decidedly.
- J. In my locality there are many places to which Strawberry Clover is best adapted. In many instances, damp and swampy land can be converted into valuable feeding pasture. It will stand flooding with several feet of water in Winter, and really seems to thrive the better after, the following Summer.
- M. For black or low-lying land by all means plant Strawberry Clover.
- N. I am that favorably impressed with the value of Strawberry Clover that I am going to plant it as much as I can and from my own observation it is a most valued plant. Five years ago I planted about 20 roots in a patch of ground that was very heavy and very wet in Winter, and grew nothing but Barley grass. In the Summer, you could almost put your foot in the cracks in the ground. Not only did the Clover establish itself and spread, but it bound the soil together and kept it firm, and it remained green while the surrounding parts were cracked and dry.
- O. There is nothing better for heavy ground, it stops it from cracking in the Summer, and is always green. I have it on the hills, and it's better than any other grass all through.
- P. Yes. It is the very best of grasses and wonderfully fattening, and prevents heavy ground from cracking open, and in every way our very best permanent grass.
- R. From my experience I cannot speak too highly of Strawberry Clover. I sowed seed about five or six years ago on bare yellow clay without any top soil, and it is now one of the best pastures I have. Strawberry Clover seems to make its own soil. Where the ground is suitable, I would plow up anything else to plant Strawberry Clover.
- S. Yes, I have a flat 2 chs. by 3 chs. which was under fine rushes, very wet for about three months. I planted less than half a bucket of roots 8 years ago, and now it is choking the rushes out. I can recommend anyone to sow Strawberry Clover on land subject to crack in the Summer; apply a liberal top-dressing, and the result is a good covering of Grass, keeping the surface moist and bound with the roots of the Strawberry Clover.
- T. No other Grass is as suitable as Strawberry Clover.
- U. Yes—the best fodder plant you can grow if it does well (if land is suitable).

SEE THE COMPARISONS ON PAGE 80

STRAWBERRY CLOVER. (Continued.)

No. 2. Do You Consider Strawberry Clover a Good Pasture Plant?

- A. One of the best and stock thrive on it.
- B. Yes. It will feed more stock in my opinion by far than any other grass or clover if put on the right land.
- C. I consider it the best milk producing and the best fattening Clover grown in this district. All stock are very fond of it. In this district in the Summer, the fattest stock are those that come off the Strawberry Clover flats.
- D. Absolutely. My neighbours dairy on it all the year round, and it is a perfect picture.
- E. In my opinion there is no pasture grown which will fatten stock quicker, put a better "bloom" on them, or carry more stock per acre, than Strawberry Clover grown on suitable country. Butchers also report that the beef and mutton produced by it always finds favor with their customers.
- F. Yes! It can't be beaten as a fodder for stall cattle, and for fattening and as a pasture plant for dairy cattle, it is one of the best.
- G. It is an excellent fodder on suitable soil. Cattle and all stock relish it greatly. It is excellent for dairy cows.
- H. Yes!
- I. Very!
- J. Yes!
- K. Strawberry Clover is relished by all stock, and its principal qualification is its fattening qualities.
- M. Yes! One of the very best.
- N. The best evidence of Strawberry Clover being a good pasture plant for dairy cows is that the supply of milk is best maintained on pastures where Strawberry Clover is prevalent. This being a dairying district, I could not say whether it is good for fattening cattle and sheep for market, but I notice that auctioneers when selling fat stock in the local market especially sheep, announce that they were fattened on Strawberry Clover.
- O. Yes.
- P. The very best.
- Q. Yes, but it requires a sea atmosphere to do best. Strawberry Clover is so liked by stock that they eat it very close, and while often there is very little leaf showing, the root formation is very strong. Strawberry Clover should be spelled from time to time.
- R. Strawberry Clover is second to none as a pasture plant, both for dairy cows and for fattening cattle for market. It does splendidly in the Summer and gives feed when Ryegrass, Cocksfoot and other Clovers are dormant. In some parts of Tasmania, Strawberry Clover grows through the Winter, but in very cold climates it is apt to remain rather dormant during this period of the year. It is most palatable to stock, as the plants mature and more succulent when further advanced than in the earlier stages of growth. It is second to none for dairy cows, and for fattening cattle for market.
- S. Yes, superior to any other, although Perennial Ryegrass thrives well with the Strawberry Clover. I have noticed all stock, whether sheep, cattle, horses or even pigs, prefer Strawberry Clover.
- T. One of the best.

"TARWEI" STRAWBERRY CLOVER REPLACES BARLEY GRASS

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

- U. Yes—the best. My experience at Sparrowvale (15 years) goes to show that Strawberry Clover on our lands is equal to the best Lucerne—acre for acre—in feeding dairy cows, and it has the additional advantage that there is no labor required in harvesting as in the case of Lucerne.

Every day in the year you can graze cattle on Strawberry Clover land, as the cows' hoofs make no impression even on the wettest days. We find that it responds to water just as well as Lucerne, and you can turn in your herd of cattle the next day if you wish it without doing the least harm. Cattle must not be grazed upon Lucerne if the land is at all wet.

We have grown Strawberry Clover on Sparrowvale up to 2 feet high, and have cut it for hay with great success. I consider it too valuable a crop to make hay of, however. The hay is perhaps not quite equal to Lucerne hay, but in the case of having too much Clover for the stock to eat, it is wise to make hay of it, and the quality is only just second to Lucerne.

No. 3. How Long in Your Experience Will Strawberry Clover Remain Under Water Without Injury?

- A. Strawberry Clover grows luxuriantly under water for an indefinite period in these parts, and is most prolific in drains.
- B. It will, in my opinion, live and grow under water for three months. I frequently set it in water courses where it is often under water for at least three months, and it thrives well. I set it in water courses to stop them from washing and it answers well; it binds and stops the wash quickly.
- C. Flood water will not hurt it; I have seen the Curdie's flats covered for three days, and it in no way hurt the Strawberry Clover. The deposit of silt left after the flood has gone does the Clover good.
- D. My opinion is that it improves it considerably to get flood occasionally, say for a week or 10 days at a time, but to say as long as ten weeks is a bit over the odds. My experience is that the more water you can give Strawberry Clover at short intervals the better, and further that Strawberry Clover does better where the water is close to the surface.
- E. Re Strawberry Clover, I have had some experience re effect of submergence. On the reclaimed Merri Swamps it is under water from 3 to 6 months every year, and this land makes up to £130 per acre. This water is not absolutely stagnant, but for all practical purposes, it may be said to be so. This water would frequently be up to 3 feet deep. Strawberry Clover grows under water, but it grows weak and pale in color, and stock stand off it a little until it gets a few showers and some sunshine. The flood waters leave it dirty very often. The only danger is that if the water does not get off until near Christmas, the hot sun will heat the shallow water and scald the Clover off the ground. This will happen with Lucerne also. I have seen a paddock for which the above price (£130 per acre) was paid, as bare of vegetation as Collins Street, from this cause. However, next year it was as good as ever again. Whether it came from the old roots or from seed remaining in the ground, I don't know. I think the former, but the owner's son thought the Clover germinated from seed on this occasion. I did not see it the following year, but know that the plants don't make much growth the first year of germinating.
- F. About three weeks of still water.
- G. It grows well in swampy ground, and in one of my low-lying paddocks it is under water for as long as 10 weeks at a stretch. There is danger of losing it though when it is flooded, say, in late Spring, and the sun beats

SWEET CLOVER IS A WONDERFUL SOIL IMPROVER

STRAWBERRY CLOVER. (Continued.)

on it when the water is shallow, then the heating of the water may kill it, and this is not uncommon on river flats. Still, there may be enough left to cover the flat again, and it may not occur in years.

- K. It will grow on river flats the best, and floods will not kill it. In fact, it seems to like floods.
- O. When the sea backs up the creek, the salt will kill it if on for long, but if only for a short time it will brown and then come away allright later. Fresh water never makes any difference if 6 to 9 months in drains.
- P. Will grow well under flood waters for weeks.
- Q. It will stand a lot of water, but it is not a water loving plant. The land should be moist and well drained. On drained swamp land it is at its best.
- R. Strawberry Clover will grow under water, although it grows very slowly, but as soon as it reaches the top, will then grow very luxuriantly. It will remain under water a long time without injury.
- S. Until after the Winter and Spring flood rains, the leaf will show as if withered, then when the Summer rains come on it will thrive to perfection.
- T. We have had portions of our Strawberry Clover flooded for a fortnight without any injury.
- U. All the Winter, if the water is not stagnant. I have never known it to be killed outright even with stagnant water, but it retards its growth.

See page 70 for the names and addresses of the growers whose opinions are quoted in this booklet.

No. 4. Is Strawberry Clover Liable to Blow Stock?

- A. No!
- B. No!
- C. I have not had any trouble in this respect, but one should be careful in turning any stock into a Strawberry Clover paddock that has been spelled in the spring and shows a rank growth of fodder.
- D. Not if continually grazed.
- F. Yes, but only with cattle brought from poor country.
- G. I do not think so. It never worries me at all.
- H. No!
- I. Not that I know of, but possibly if it was long and there was no other feed.
- J. I have never known an instance in which stock are blown. Of course, when turning hungry stock upon a heavy growth, a little precaution may be necessary.
- M. No!
- N. I have never heard any dairyman complain about bloat with eating Strawberry Clover.
- O. I have had twenty years with it on the farm, and have never had a cow blown with it yet. I milked 40 and fattened last year 24, beside a lot of sheep, and they get fat at any time.
- P. No.
- Q. Do not think so. It seems to be one of the safest Clovers in this respect.
- R. There is no great danger in this respect with Strawberry Clover.
- S. I cannot say, as I have always had my pastures mixed with Cow Grass, White Clover and Trefoil. I had one cow blown last year; I think the Cow Grass is the cause, before it flowers.
- T. No!

TOP-DRESSING PASTURES IS A PAYABLE PROPOSITION

FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

- U. Not unless the stock have been previously starved. We often have trouble with Lucerne, but none with Strawberry Clover.

No. 5. Do You Have Any Difficulty in Getting this Plant to Grow from Shelled Seed?

- A. No!
- B. No, I had no trouble. I never even harrow the ground, but sow after a burn, and simply sow on top of the ashes. I have had good results from same, and always sow the seed in sand, mixed well together.
- C. None whatever!
- D. Not to my knowledge
- E. I have always got a good germination from your seed, which is simply thrown over the pasture without any cultivation whatever. The result has been sufficiently good to induce me to pass back for a "second help" every year for the last 10 years at least.
- H. No!
- J. I have seen it successfully established from the seed.
- L. We established our experiment from roots, but see no reason why it should not grow from shelled seed.
- M. If I were sowing down clean land, I would get the "TARWEI" Shelled Seed and sow it in April or May. I had no difficulty, although it did not show the first year with me, but the second it came away wonderfully.
- N. I have had no experience from shelled seed, but from some seed in husks I purchased from you, 1 lb. I think it was, there were only a few plants and these have spread well.
- O. I always sow the plants. Seed comes in the cow dung and does well.
- P. No!
- U. Yes. We find it grows best after it has been through the cow

No. 6. How Long Have You Had Strawberry Clover Established, and Do You Consider It Thoroughly Permanent.

- B. I sowed my first paddock 10 years ago, and have grazed it heavily ever since. It is as good as ever, and I cannot see any difference in it as yet.
- C. I planted it 10 years ago. It only needs to be planted once, and it will soon spread and form a thick mat.
- F. I have had Strawberry Clover growing on my flats for the last 25 years. It has never been top-dressed, and carries over a cow per acre.
- G. My experience is that it is permanent and spreads itself into a close thick sward.
- H. 10 years. It is thoroughly permanent.
- I. About 10 years or so. It is permanent for at least 15 to 20 years.
- K. I have had it established on my property close on 40 years on the damp portions of my land.
- M. Should say from 8 to 10 years. It is thoroughly permanent.
- N. Yes! I have known it to exist and spread in the same place for a few years.
- O. Yes. Will send you some roots if you like.
- P. I have had it on the river flats for 18 years, and it is better now than 18 years ago.
- Q. Yes. Have had it established from 10 to 14 years.
- R. I have only had it for about six years, but it appears to be quite permanent.

GROW "GARAWI" SUDAN GRASS FOR SUMMER HAY

STRAWBERRY CLOVER. (Continued.)

- S. Sixteen years. Yes, if fed off well, I mean it will dwindle if kept in an enclosure and not fed off.
- T. Our experience extends over about 10 years, and we consider it improves each year.
- U. We have had it in Sparrowvale for 15 years. I should say there is no limit to its life, because it is always renewing itself both from seed from the cow droppings and from root growths like the fruiting Strawberry. Our Strawberry Clover has spread from a few insignificant patches during the past 15 years until it practically covers the whole area. We have helped it in many ways, chiefly through irrigation, but have never had to sow a whole field. It will not grow on salt patches, but after washing the salt out with fresh water it soon covers the land. I should not like to have to manage Sparrowvale without the Strawberry Clover.

No. 7. Do You Top Dress the Established Fields, or Do You Lime at Intervals?

- A. No!
- B. No!
- C. I top-dress every year if possible (1 bag, 186 lbs. to the acre) No. 1 Super, and it has well repaid me. I can carry just double the amount of stock on a given area; in fact, if one is not prepared to top-dress grass, far better never to sow it.
- D. None whatever.
- F. I have had Strawberry Clover growing on my flats for the last 25 years. It has never been top-dressed, and carries over a cow per acre.
- G. No. Flood waters supply silt for manure.
- H. No. Floods cover it every Winter, and the silt is good manure.
- I. No!
- J. I have not used lime, I do use Superphosphate, and I find that no grass responds better to a top-dressing of Super. Even though the land be wet in Winter, I believe in applying the Super. when the water is going off and the land damp and spongy.
- K. Strawberry Clover requires no attention on river flats, or on ground that is damp in the Summer time. I have never seen it top-dressed on the Tarwin Lower Flats.
- L. As Strawberry Clover is grown on wet places, it requires top-dressing every year to keep a good supply of soluble phosphate in the ground.
- M. No, it is not necessary to do so, and it will grow without it, but it pays to do it. Top-dress by all means.
- N. Probably it would be an advantage, as it is with all permanent pastures, but it seems to go ahead without it.
- O. Top-dress, and it comes away quick and seems to like it.
- P. I top-dress with Super. every other year, about 1½ cwt. to the acre.
- Q. No!
- R. I don't think Strawberry Clover actually requires top-dressing, but I top-dressed last year for the first time, and it was wonderful the way in which the plant responded to the treatment, and while **not absolutely necessary**, top-dressing always pays.
- S. I top-dress with 1½ cwt. Superphosphate per acre yearly, with full satisfaction.



DON'T NEGLECT LIMING YOUR LAND. IT PAYS!!



FODDER CROPS FOR AUSTRALIA

STRAWBERRY CLOVER. (Continued.)

- T. We top-dress every other year with No. 1 Superphosphate about 112 lbs. to the acre.
- U. We top-dress with Superphosphate every two or three years, but I have never been able to see any appreciable benefit in our lands. The drill breaks up and spreads the manure, and that also benefits the pasture. There is a bed of shell 1 to 1½ feet thick beneath all our land, from 2 to 4 feet down.

No. 8. To What Extent Does Strawberry Clover Improve the Value of Land?

- B. Strawberry Clover has improved the value of my land very much. It is to-day worth £20 per acre as against £5 per acre for paddocks only separated from my Strawberry Clover pasture by a fence. To my mind Strawberry Clover carries more stock than any other grass that can be sown, and my land has gone up in value during the last six years from £5 per acre to £20 per acre, where I have Strawberry Clover established.

Now I hear my neighbours are sowing Strawberry Clover this year, as they are quite satisfied that it is the best grass where it suits the land.

- C. First of all, Strawberry Clover is a nitrogen gatherer, therefore it increases the nitrogen contents of the soil. Strawberry Clover is a legume, therefore it is just what the dairy cow requires; there is nothing like it to produce milk. Young growing stock, such as calves and lambs thrive well on it.

It requires most heavy land to grow it to perfection. In this district there are Marl hills or Limestone hills. Generally speaking, the slopes leading from these Marl hills contain black moist land. These slopes are the home of Strawberry Clover, and once it gets a start, it soon spreads and forms a thick creeping mass of Strawberry Clover.

All along the Curdies River are black heavy flats, and this country is also the home of Strawberry Clover.

In my opinion there is no other Clover in these parts that will, acre for acre, produce as much milk or fatten as many stock, and when land is being sold in this district, Strawberry Clover country will always sell readily and bring the highest price.

The land on my farm, 176 acres, consists of heavy moist loam (not black land), brown loam and light loam. I have 10 acres of Strawberry Clover on the Creek flats (heavy loam) and have another 10 acres that will grow Strawberry Clover. This last 10 acres of Strawberry Clover is in a 50-acre paddock of grass, and when I have stock in, they soon pick out the Strawberry Clover, prefer it to other Clovers, and feed it very close to the ground. This is a sure sign that it is of high feeding value.

I will now tell you some neighbours who are fortunate to have Strawberry Clover land, heavier and moister ground than mine, in the Summer and Autumn, and who depend almost entirely on Strawberry Clover for their cream.

Messrs. Rowe Bros., Scott's Creek, Mr. Alex. McDonald, Cowley's Creek, Mr. Stewart Lord, Port Campbell, Mr. Archie Eastwood, Port Campbell Road, Cobden. These men are all practical farmers, all believers in top dressing, and all have a splendid stand of Strawberry Clover. I honestly believe that from October to April they could run one cow to the acre on their Strawberry Clover. Rowe Bros. and Mr. Alex. McDonald have the Clover growing under the Limestone hills. Mr. Lord has it growing on the Port Campbell Creek flats, and Mr. Eastwood has it growing on the Curdie's River flats. I just mention these few because they have Strawberry Clover growing to perfection, and each one of them will tell you they get more cream and fatten more stock on their Strawberry Clover than all their other Clovers put together.

SEE PAGE 70 FOR NAMES AND ADDRESSES OF GROWERS

STRAWBERRY CLOVER. (Continued.)

Mr. Lord will tell you it was about 12 years ago that Strawberry Clover was first noticed on the Port Campbell Creek. I suppose then the flats were valued at £10 an acre. To-day they are worth £30 or more an acre, simply because the Strawberry Clover has spread wonderfully, and improved the carrying capacity of the land.

- D.** I say without fear of contradiction that as regards the value of land where Strawberry Clover is well established that it is 100 per cent. more valuable than any other land where other grasses are grown, as far as both its fattening and milk producing properties are concerned.

There is no doubt that you have had reports from other graziers in my district in regard to this matter, but it is a well known fact that where property is offered for sale with Strawberry Clover grown on it, there is always a keen demand for it, so that speaks for itself.

- E.** On congenial land subject to inundation, Strawberry Clover might improve it in value from £5 to £50 per acre, and on my own land, which is heavy tenacious stiff black soil it has increased the value by at least 100 per cent. On the other hand it may be sown where it would never be more successful than ordinary pasture. I know places where it has existed for many years, but has made no headway.

Strawberry Clover will not be successful on poor hungry soil, even though same be wet or subject to inundation. Nor will it thrive if the soil is lacking in sufficient lime.

Given a fairly rich soil containing sufficient lime, it will be successful, and if the subsoil remains moist throughout the Summer it will attain its greatest value. It is, in a general way, a Summer grower, and one of its chief virtues is the fact that it provides a great amount of feed in the Summer and Autumn, when other pasture has dried off. It thus enables a man to buy stock when other men are obliged to sell. No other pasture can excel it for fattening or milk production.

You will understand then that low-lying land, where permanent water is not far below the surface, suits it best, even though it may be under water for a fairly long time in the Winter.

Some of the Merri Swamp reclaimed land, about a mile south from Nestle's Condensery at Dennington, is under water for four months during the year. It is covered with Strawberry Clover. Possibly no other grass would survive under such conditions. Yet it has brought £130 per acre at auction; and not only that, but limestone rises on the Farnham Estate close by realised £150 per acre for the purpose of carrying the stock that are flooded off the Strawberry Clover in the Winter. These rises by themselves would not be worth half the money.

The added value given to land by pasturing with Strawberry Clover depends then on whether it **only** grows or grows **luxuriantly**, and that depends on the suitability or otherwise of the particular land under consideration.

- H.** Strawberry Clover improves land, as it keeps it from cracking in Summer, and where it would otherwise be dry in Summer, it is always green with Strawberry Clover. I could not say what it increased in value.
- J.** It is difficult to say exactly what is the increased value of land upon which Strawberry Clover has been established. In some instances more than others. For example, rough swampy land which carried very little stock previous to the introduction of the plant, is enhanced in value many times over, while good agricultural land, which previously carried a good growth of other useful grasses would not be enhanced to such an extent. But in any case, where the successful establishment of the plant enables more stock to be carried, the increased value of the land is obvious.
- L.** We should say that heavy swampy soils adapted for natural grasses, when sown down with Strawberry Clover, would be more than doubled in carrying capacity. Whether it improves the soil for cultivation purposes we could not say, as when once established with Strawberry Clover one never thinks of plowing it up again.

STRAWBERRY CLOVER. (Continued.)

Re the value of Strawberry Clover as a pasture, a small paddock of 5 acres of river flat in Heywood has been carrying (7) seven head of stock since last October, and they are in splendid condition, and as a dairying pasture it is unequalled. We might add that this paddock was top-dressed.

- M. Supposing there are two blocks of land alike in every detail except that one is well established with Strawberry Clover pasture all over it, and the other has a pasture without Strawberry Clover. I would prefer the block with the Strawberry Clover established at £20 per acre to the other one at £10 per acre, that is, I consider it makes the land 100 per cent. more valuable.

The following incident will give you some idea of how it is in favor in this district (Timboon). I sometimes meet at the railway station, a dairyman who has Strawberry Clover established over his farm situated seven miles from here. One day I remarked, "Sam, your horses have fine clean coats, and look beautiful, my own horses are always fit, but what makes yours look so nice? You must brush them up well." He replied, "No, Jack, never have a brush on them; Strawberry Clover is responsible, when you get that, the stock will all have clean coats and look well."

Another farmer told me that when laying down land in the future he would always put down a certain amount of Strawberry Clover seed, and another farmer told my wife that although he had to go to a lot of trouble to establish Strawberry Clover, it well repaid him, and all these men are practical farmers.

There are other good grasses, but Strawberry Clover suits this moist district.

- N. Principally from want of opportunity, it is only during the last two years that I have sown any Strawberry Clover, but from what I have done and from observations of what others have done, I am quite convinced that a property with a good mixture containing Strawberry Clover would be greatly enhanced in value, and if Strawberry Clover replaces Barley Grass, which I understand it does, it would increase the value of such land fully 60 per cent.

In mixture with Rye Grass and other permanent pasture grasses, its value is almost beyond estimate, especially as a preventative of grass fires. Strawberry Clover does not always need river flats and marshy land, and I have seen it flourishing where one would wonder where it got its moisture from.

I am quite certain Strawberry Clover is going to be the favorite feed for stock wherever it can be grown.

- O. We got our farm for £4 per acre twenty years ago. There was no Strawberry Clover established then, but now I've been offered £40 cash per acre, which is good for an out of the way place like this (Port Campbell).

- P. Makes it worth £50, or even £100 per acre. Say £20 per acre to begin; it makes it worth five times its original value.

- R. By over £5 per acre (Tasmanian experience).

- S. Fourfold with top-dressing. Mr. Stanley Lowe can bear out my statements, as he has been over my paddocks. This time last year, when there was very little green feed, 14 miles inland from here, it being a very dry Summer and Autumn, my grass was green all through the Summer.

- T. If properly laid down, it should in about three years be worth three times its present value. It would be very hard to estimate the value of Strawberry Clover land. It grows about 10 months out of 12, and for any sticky land or for land that is subject to crack or cricket-infested it works wonders.

- U. Strawberry Clover land in Sparrowvale (irrigable) is worth anything between £60 and £100 an acre. Originally it was worth perhaps £3. The Strawberry Clover has a great deal to do with the added value.

“TARWEI” STRAWBERRY CLOVER and LOTUS MAJOR

BOTH HAVE THEIR OWN DISTINCT SPHERES OF USEFULNESS.

A Comparison of these two “Best of All Moist Land Plants.”

“Tarwei” Strawberry Clover and Lotus Major are undoubtedly the best moist land plants suitable for the conditions ruling in this State, and although there are many points of similarity between these two Clovers, each has its own special conditions and requirements. As a general rule, the certain particular conditions, especially congenial to one, are unsuitable for the other, and vice versa. As in many instances both “Tarwei” Strawberry Clover and Lotus Major are grown in the same district, there has been a certain amount of confusion as to which to plant for the prevailing moisture, soil, and other conditions, and as neither supersedes the other, a few remarks on their points of similarity, as well as on their differences, will assist the reader in selecting the variety best suited for his own particular conditions.

The points of similarity of these two excellent Clovers are that both will stand flood and revel in moist conditions, both are of creeping habit, and thoroughly permanent, and both yield fodder practically the whole year round. The forage of each has a very high feeding value, although “Tarwei” Strawberry Clover is to be preferred in this respect where conditions suit, but both these Clovers are extremely valuable for fattening sheep, cattle, horses and pigs, and each ranks very high as a milk-producer for dairy cows, although, as previously stated, “the pride of place” is held by “Tarwei” Strawberry Clover, which has the highest feeding value of all the fodder plants cultivated in this State.

The principal points of difference between “Tarwei” Strawberry Clover and Lotus Major are in the soil and class of country. “Tarwei” Strawberry Clover is valuable for heavy river flats, black loamy soil, salty ground, and heavy land liable to bake and crack in the Summer. It is especially useful for binding wash-outs. “Tarwei” Strawberry Clover is also best adapted to conditions within say, 50 miles of the seacoast, and seems to thrive on the salty ocean breeze. It appears to be hardier than Lotus Major inasmuch as it grows well on open country, providing the ground is moist and on the heavy side.

Lotus Major appears to be best suited to land containing a proportion of sand, and gives the best results on sandy marshland, heavily timbered country and sandy forest and bracken fern country. It is partial to the damp, sandy soil in creeks, gullies, and hilly forest clearings, and should be planted for preference on dirty, saggy country, and land that has not been cleared, even if it is heavy ground, and it is especially valuable on bracken fern country. Lotus Major appears to thrive on the protection of the timber and the bracken fern, doing exceptionally well while the land is in this condition, but curiously enough, as soon as the ground is cleaned up and open, it does not appear to thrive, and under these circumstances, on heavy ground, once cleaned up, “Tarwei” Strawberry Clover will give the better results.

Mr. C. Larson, Carlisle River, in a personal interview, 12/7/21, stated:—

“On dirty saggy country and stuff that has not been cleaned up even if heavy ground, plant Lotus Major for preference, but as soon as the ground is cleaned up or on heavy ground well out in the open plant Strawberry Clover.

“By sowing Lotus Major very thickly the first year, about 3 lbs. to the acre it will more than hold its own against the sags and growths and all that sort of thing, thereby enabling you to grow fodder and get a return from land which would otherwise be practically useless. If a fire is put over Lotus Major the second Summer, it will come up thicker than ever the following Spring.

“Where conditions suit Strawberry Clover, it is the finest pasture plant I know of.”



THE VALUE OF A GUARANTEE IS WHO GIVES IT

LOTUS OR BIRDSFOOT TREFOIL

The Birdsfoot Trefoils are very useful plants, both for general pasture purposes, as well as for hay, and as pasture have a very high value as milk producers. The most largely grown, and undoubtedly the best variety, is Lotus Major or Villosus (Greater Birdsfoot Trefoil), which has been established in the Otway Forest for over 40 years, and is there regarded as one of the principal fodder plants, as will be realised from the fact that it is often known as Beech Forest or Otway Forest Clover. The other sorts most generally grown in Victoria are Lotus Corniculatus (Minor Birdsfoot Trefoil), and Lotus Angustissimus, sometimes known as Boyd's Clover. These three varieties vary somewhat, and each is dealt with separately, while to obviate any confusion between the different sorts, the botanical name is in each case used throughout this article.

LOTUS MAJOR OR VILLOSUS

(Greater Birdsfoot Trefoil.)

Lotus Major is a deep-rooted leguminous perennial with yellow flowers, thoroughly permanent when once established, and very adaptable to different classes of soil. The plants send down strong tap roots which, on reaching the clay subsoil, send out laterals, which come up all round the parent plant. On the surface, Lotus Major forms runners which, rooting at every joint, soon establish the plant and ensure its permanency. Owing to its habit of growth, it soon smothers other grasses and weeds, and is particularly valuable for killing tussocks and checking the growth of bracken fern.

The feeding value of Lotus Major is high, and it is extremely valuable for fattening cattle for market, as a milk producer for dairy cows, or as a pasture for sheep, horses or pigs. It can be cut and cured for hay, which is of excellent quality and, like all the members of the leguminous family, is a soil improver. In this respect, however, it might be more aptly termed "An Improver of Land Values," inasmuch as in very many instances, it converts useless land and abandoned forest country into first-class grazing areas. The plant does not appear to be dangerous as regards "Bloat."

SOME SPECIAL POINTS OF LOTUS MAJOR

1. IS THOROUGHLY PERMANENT WHEN ONCE ESTABLISHED.
2. VALUABLE FOR MOIST FOREST LAND AND BRACKEN FERN COUNTRY.
3. WILL STAND A FAIR AMOUNT OF FLOODING.
4. YIELDS FODDER PRACTICALLY THE WHOLE YEAR ROUND.
5. HAS A HIGH FEEDING VALUE FOR HORSES, SHEEP, PIGS AND CATTLE.
6. IS A GREAT MILK PRODUCER, AND THUS EXCELLENT FOR DAIRY COWS.
7. VALUABLE FOR CLEANING UP TUSOCKY LAND AND GROUND CARRYING BRACKEN FERN.
8. IS AN IMPROVER OF LAND VALUES BY INCREASING PRODUCTIVITY.
9. IS EASILY ESTABLISHED AND IMPROVES WITH AGE.

CLIMATIC AND SOIL REQUIREMENTS.—It is best suited to districts with a moist climate, and, although generally regarded as a moist ground plant, it also appears to grow well in certain fairly dry situations, and yields medium to good results on land varying from stiff clay to sandy loam. It roots and runs, and soon forms itself into a dense sward, doing well on either hill land or marsh country, while it is particularly valuable in forest country where the rainfall averages over 30 inches per annum. The most suitable soil is moist forest sand, such as is found in bracken country.

INCREASE PRODUCTIVITY, USE BRUNNING'S SEEDS

LOTUS MAJOR. (Continued.)

On swampy land that only grows rushes and useless vegetation, Lotus Major will thrive, and growing rapidly, soon chokes out the rushes and sags, while it converts sour and abandoned forest country into excellent grazing land.

Mr. D. J. Boag, Walkerville, via Fish Creek (4/4/21), writes:—

"Lotus Major is very good on my country, which is a sandy marsh and nearly always under water, though only a few inches deep. It grows up to 3 feet high amongst the tussocks and is greatly relished by stock."

Mr. Thos. Hall, "Woodlands," Beech Forest (5/7/21), writes:—

"I think very highly of it as a fattening and milk-producing fodder under grazing conditions. It flourishes on swamp or marshland, climbing over the sedge and tussocks and is very partial to creeks and gullies in hilly forest clearings. I have also seen it growing luxuriantly on the sides and tops of steep hills in good blue gum country.

"It also grows fairly if sown on any good undulating hill country, but prefers the damper shelves and hollows. A loose soil with a grain of sand suits it."

It appears to be proof against rabbits when once thoroughly established, and during a period of several years, these rodents have not succeeded in killing out the plant in the Otway Forest.

SOIL PREPARATION.—As a rule, the conditions under which Lotus Major is grown preclude any elaborate soil preparation, although as with all cultivated plants, a well prepared seed bed, where possible, will always ensure a good stand, but generally, Lotus Major is sown on a "clean burn," and does particularly well sown in the ashes after burning scrub, especially in damp places. It is easily established on any forest country that will carry a light fire, and once established, is permanent, the stand improving with age.

SEED SOWING.—The seed of Lotus Major is generally broadcasted, and when sown by itself, should be mixed with dry silver sand, in order to ensure even distribution. The best sowing period is from the first Autumn rains in March or April, up till the begin-

ning of June, although, under suitable conditions, seed may also be sown in August and September. When seeded alone, the quantities vary, and up to 7 lbs. per acre is sometimes used, but from 3 to 4 lbs. of good seed will be found ample to establish a good stand, and as the plant soon spreads, any blank spaces are quickly covered.

It is advisable, wherever possible, to sow just prior to rain, and after showery weather the seed soon germinates, and the plants make rapid growth. Where weather conditions are unfavorable, Lotus Major is slow in starting, and on this account it is really better sown alone, as when seeded in mixtures the other grasses and clovers usually strike first, and are apt to smother out the Lotus Major while it is still in the younger stages of growth. Good results, however, have been obtained by sowing from $\frac{1}{2}$ to 1 lb. of Lotus Major, mixed with other grasses and clovers, but it is advisable to restrict sowing this Birdsfoot Trefoil in mixtures to conditions especially congenial to it.



Lotus Major. (Greater Birdsfoot Trefoil.)

FODDER CROPS FOR AUSTRALIA

LOTUS MAJOR. (Continued.)

SUBSEQUENT TREATMENT.—At first, the plant makes rather feeble growth, especially if weather and other conditions are unfavorable, but once established, is quite hardy, and thence onwards grows strongly, making very rapid progress. It soon runs over logs and tussocks, forming a perfect network of roots and foliage in soft places and boggy spots in gullies, thus making the ground perfectly safe for stock, and obviating any danger of their becoming bogged, while, owing to its habit of forcing itself amongst bracken fern, rushes, sword grass, and other useless vegetation, Lotus Major is particularly valuable for killing out these useless growths.

Lotus Major seems to grow stronger and taller in a paddock of bracken fern, apparently appreciating the protection thus afforded. The plants keep green throughout the whole of the year, and are thus valuable for adding the necessary succulency to the feed, when other grasses and clovers are dormant. The more closely cropped a thoroughly established paddock of Lotus Major is kept, the better, as close feeding encourages the plants to stool out and spread, while if it is desired to feed green, rather than to graze, the crop can be protected from the stock, when several cuttings will be obtained in a single season. When cut just after the blooming period, Lotus Major makes hay of excellent quality. The value of this plant is now fully recognised and appreciated in the Beech Forest and Colac districts of Victoria.

Lotus Major would doubtless respond well to an occasional top-dressing with Superphosphate, but practical experience has shown that this is not essential, and so far excellent results have been obtained without any subsequent applications of fertiliser.

LOTUS CORNICULATUS

(Minor Birdsfoot Trefoil.)

While Lotus Corniculatus or Minor Birdsfoot Trefoil is a true perennial, and thoroughly permanent, it is suitable only for dry, sandy soils, on which it produces a large amount of herbage. The plant has narrow leaves, a smooth stem and bright yellow flowers, occasionally tinged with red.

While adapted to dry, sandy land, a certain amount of lime is necessary, and where lacking, must be applied to the ground prior to seeding. The seed may be sown during the Autumn and early Winter (from March to June), and when sown by itself 15 lbs. of good quality seed will be required per acre. Lotus Corniculatus is often included in mixtures, in which case from 1 to 3 lbs. of seed will be required for the same area. When sown by itself, the seed is generally mixed with dry sand to ensure an even distribution.

Lotus Corniculatus is useful both as a pasture plant and for making into hay. As a pasture, it is palatable to stock, except when it is in flower, a condition which very often arises also with Cowgrass and Red Clover.

While the plant has a very definite value on a few certain classes of soil, Lotus Major, or one of the other Clovers, will generally be found more satisfactory and productive under most conditions ruling in this State.

LOTUS ANGUSTISSIMUS

(Boyd's Clover.)

Lotus Angustissimus, commonly known as Boyd's Clover, is closely allied to Lotus Major, but is an annual and not such a valuable plant as the latter. It has its uses, being particularly suitable for poor, inferior country, which will not grow Cocksfoot, Ryegrass and the better Clovers. It has the special merit of coming in early, and when stocked in the younger stages of growth, is excellent fodder for milking cows.

Subterranean Clover will however do all or more than Lotus Angustissimus, and is thoroughly permanent, and will generally be found a much better proposition for poor land.

Although an annual, when not cut for hay at the flowering stages, but grazed, Lotus Angustissimus may renew itself, and in spite of the grazing,

FIRST IN 1852. STILL FIRST IN 1922

LOTUS ANGUSTISSIMUS. (Continued.)

ripen enough seed to do so. The best time for cutting for hay is just as the plants are coming into bloom. The plants must be kept grazed down, as when far advanced in growth (from the blooming period onwards), the foliage is not palatable to stock. Lotus Angustissimus is useful as a green manure, enriching the soil by the addition of humus, and it is adaptable to a very wide range of soils.

The seed is sown broadcast in the early Autumn at the rate of from 4 to 5 lbs. per acre. Lotus Angustissimus is often included in mixtures with other grasses and clovers, when 1 lb. of seed per acre will be ample.



"Mesgawi" Berseem Clover. (See page 85.)

See pages 119 to 123 for details of Permanent Pasture Mixtures of Grasses and Clovers for the Irrigation Areas.

Lotus Angustissimus and Paspalum Dilatatum make a first-class mixture for certain classes of land, as the former comes in early, and when it is over, the Paspalum Dilatatum is in full growth. It is not anticipated, however, that the special features of Lotus Angustissimus are sufficiently valuable to cause it to be very extensively used in Victoria.

"MESGAWI" BERSEEM, THE "MORTGAGE LIFTER," PAGE 85

"MESGAWI" BERSEEM CLOVER

(*Trifolium alexandrinum* var *Mesgawi*.)

"Mesgawi" Berseem Clover, or Egyptian Clover, is an annual with white flowers smaller than those of White Dutch Clover, which, under certain conditions, will re-seed itself, but favorable conditions are necessary, and on account of the thin stand likely to result, Berseem Clover is generally treated as an annual and re-sown every year. On account of its resemblance to Lucerne in growth, utility, etc., Berseem is sometimes termed "The Winter Lucerne," a very fitting title for a plant which so amply fills in the period of the year when Lucerne is generally more or less dormant. Berseem is extremely valuable for growing under irrigation, and gives especially good results grown in this way in the Northern Irrigation areas of Victoria.

The following letter from Mr. G. E. Lane, Director of Housing, Irrigation and Reclamation Works Dept., Adelaide, S.A., 25/11/18, will be of interest:—

"On the 23rd inst. I was at Murray Bridge, when I found the farm was cutting the sixth cut of Berseem. The machine was then cutting over the exact spot where we took the fifth cut from and sent you a sample of same. The paddock is even looking better than it did on the 5th cut. I have instructed my people to forward you on a sample cut of this 6th, and it will arrive some time this week.

"Query:—Can we keep this crop going throughout the Summer? Am going to have an extra **big try**; have every confidence of success, and if so, quite satisfied that Berseem Clover is worth 50 per cent. above Lucerne for Dairying. At present 40 head cannot keep down eight acres of Berseem.

"We are satisfied that on proper irrigation lines, Berseem is going to give you people in Victoria a wonderful lift in dairying, and any assistance I can give you will be a pleasure to fulfil."

"Mesgawi" Berseem Clover and Skinless Barley makes the ideal Winter Feed Mixture for the Northern and North-Western parts of Victoria.
See pages 124 to 127 for details.

VARIETIES.—There are four varieties of Berseem Clover, but the type which has given such successful results, under Australian conditions, is the genuine "MESGAWI," and farmers should be careful to sow only the "MESGAWI," and not to accept any of the other sorts, which have been proved to be inferior for Australian conditions. To obviate continual repetition, it will be understood that the term Berseem Clover, as used in these pages, REFERS ONLY TO THE GENUINE "MESGAWI," AND NOT TO ANY OF THE OTHER THREE VARIETIES, which are the "Fahli," the "Saidi," and the "Khadrawi."

CLIMATIC CONDITIONS.—At first glance, Berseem Clover would actually only appear to be suited to such districts as the River Murray areas in S.A., the Northern Irrigation districts of Victoria, the Goulburn Valley and those parts of the Commonwealth having a fairly mild Winter, but in actual practice it has been proved that Berseem will grow successfully under much colder conditions. The secret, however, of growing Berseem successfully in the colder and in practically all parts of this State is TO GET SEED SOWN EARLY ENOUGH TO PERMIT THE PLANTS TO BECOME ESTABLISHED, AND TO MAKE A GOOD GROWTH BEFORE THE COLD WEATHER SETS IN. (See No. 1 on page 91.)

Berseem has already given excellent results as a Winter fodder in the cooler parts of Victoria, at Heywood, Casterton, Menzies Creek, Pakenham and Glenhope East (about 20 miles from Kyneton), as well as in Tasmania. The plant requires a fair amount of moisture, and is therefore exceptionally well adapted for growing under irrigation, especially as the weather conditions prevailing in most of the irrigation areas in Australia are so congenial. (See No. 7 on page 93.)

BERSEEM AND SKINLESS BARLEY FOR WINTER FEED

"MESGAWI" BERSEEM CLOVER. (Continued.)

UTILIZATION.—Berseem Clover primarily excels as a "Winter Fodder," and is a many purpose plant. It yields excellent pasture, can be cut for green feed or made into hay. Its feeding value as green fodder is equal to that of Lucerne, and owing to the fact that it adds large quantities of nitrogen and humus to the ground, it is a splendid soil improver, and is unequalled as a predecessor to the "King of Fodders." It should be more valuable than Field Peas or Tares for green manuring in orchards and vineyards, and will give much greater yields than either of these. It is a splendid milk producer and unlike some other valuable fodders, **does not taint milk.**

Professor Arthur J. Perkins, Director of Agriculture for South Australia, writing in the "Journal of Agriculture of S.A.," March issue, 1921, remarks, under heading of "Winter Green Feed":—

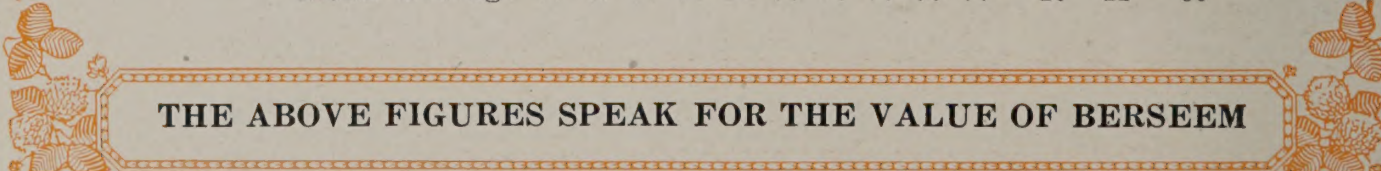
A reliable winter growing forage crop is invaluable for dairy cattle where pasturage is at times scanty and uncertain. Berseem Clover, which is capable of rapid growth at comparatively low temperatures, provides the type of plant desired, and, if properly managed, it may be confidently expected to yield from 25 to 35 tons of succulent, nutritious, and palatable provender per acre. The important facts connected with Berseem culture are:—

1. It can only be grown to advantage under irrigation.
2. It is an annual, and must be sown afresh every year.
3. It must be seeded early—March and early April—in order to gain a grip of the land before the soil temperatures fall.
4. It must be sown on a well-prepared and heavily manured seed bed that has been worked down very fine on top.
5. The seeding must be heavy—30 lbs. per acre—and the seed must be very lightly covered with roller or brush harrows. (This quantity doubtless refers to very rich, moist land.)
6. The land should be irrigated immediately after sowing, and thereafter as required. Frequency will depend on nature of winter rainfall and rate of growth.
7. Crop must be cut and carted to stock, not grazed in situ. Start moving as soon as new shoots appear at the crowns. Given proper attention, a stand of Berseem Clover should give three to four cuts a season, between June and November.

The following table, on page 676 of this issue, shows returns from Irrigated Berseem at Roseworthy College over a period of 9 years. From this it will be seen that the average yield per acre is over 29½ tons.

This table also shows that Berseem thrives on moisture.

Year.	"Useful" Rain.	Area.	Total Yield.			Acre Yield.		
	Inches.	Acres.	T.	C.	L.	T.	C.	L.
1912.. ..	13.05	1.190	38	12	56	32	9	18
1913.. ..	10.82	3.201	108	19	97	34	0	111
1914.. ..	6.12	2.294	46	16	94	20	8	43
1915.. ..	18.35	3.411	98	16	66	28	19	53
1916.. ..	20.25	4.643	165	1	48	35	11	6
1917.. ..	17.25	4.003	115	16	55	28	18	12
1918.. ..	10.53	3.693	107	18	93	29	4	64
1919.. ..	8.22	3.384	96	1	108	28	7	107
1920.. ..	16.76	1.368	39	7	21	28	15	89
						T.	C.	L.
Mean Average .. .						29	12	89



THE ABOVE FIGURES SPEAK FOR THE VALUE OF BERSEEM

FODDER CROPS FOR AUSTRALIA

"MESGAWI" BERSEEM CLOVER. (Continued.)

For bulk of fodder, it stands alone as a Winter and early Spring feed, and providing seed is sown early in the Autumn on good ground, six cuttings in a season are not exceptional, while one instance is recorded in this State of nine cuttings being obtained between February and December. See also what Mr. Douglas says on page 69.

Candee Poultry Farm,
KENNINGTON,
16th February, 1921.

The Manager,
Bunning's Agency.
BENDIGO.

Dear Sir,—

I have great pleasure in advising you regarding the unqualified success which I had last year with Berseem Clover purchased from your store.

The seed was sown in February, 1920, and thrived so well right through the Autumn, Winter and Spring, that **I WAS ABLE TO SECURE NINE (9) MATURED CUTTINGS FROM THE CROP FOR THE YEAR.** The last one being taken off in December.

As a Winter green food for Poultry I consider it is unbeatable, its high nitrogenous content greatly assisting the production of eggs during a period of the year when eggs are at a premium.

Much of my success may be attributable to the heavy dressing of fowl manure which I was fortunately able to provide.

I would strongly impress upon growers the need to cut the clover first when only a few inches high, in order to induce a better stool and subsequent stronger growth.

Yours faithfully,

(Signed)

W. E. BURRIDGE, Proprietor,
Candee Poultry Farm.

WHY YOU SHOULD GROW BERSEEM.

1. GROWS IN THE WINTER LIKE LUCERNE IN THE SUMMER.
2. CAN BE PASTURED, CUT FOR GREEN FEED, OR MADE INTO HAY.
3. CLEANSSES THE LAND, AS THE CUTTING DESTROYS THE WEEDS.
4. CAN BE PLOUGHED IN FOR GREEN MANURE.
5. ADDS NITROGEN AND HUMUS TO THE SOIL.
6. UNEQUALLED AS A PREDECESSOR TO LUCERNE.
7. WILL AVERAGE FROM FOUR TO FIVE CUTTINGS IN A SEASON.
8. HAS YIELDED NINE CUTTINGS IN THE ONE SEASON.
9. A SPLENDID WINTER FODDER FOR DAIRY COWS AND DOES NOT TAINT MILK.
10. DOES NOT CAUSE "BLOAT."

Berseem cleanses the land very thoroughly as being a strong and vigorous grower, it will, providing seed of good germination is sown thickly, choke out most of the weeds, the remainder being disposed of during grazing or by cutting for green feed.

(See No. 3 on page 91 for opinions of practical farmers.)

BRUNNING'S LUCERNE SEED IS DODDER-FREE

"MESGAWI" BERSEEM CLOVER. (Continued.)

SOIL REQUIREMENTS AND PREPARATION.—Berseem requires plenty of Lime in the soil, and where lacking, an application of this element must be given before preparing the ground. The land must be properly drained, well supplied with lime, and thoroughly broken up, so that there is no hardpan or impervious subsoil to check the growth of the plant. As good soil is necessary, where lacking in plant food, fertiliser must be added to supply this deficiency.

Berseem also does particularly well under irrigation, and can be grown most successfully on land with a uniform slope of from 10 to 20 feet per mile. This land costs little to put in shape for watering and the slope ensures good drainage. Where such conditions do not exist, it is advisable to sow in ground as near this as possible, as the proper laying out of the land is one of the most important items to be considered, and thorough soil preparation in the first place will save a considerable amount of time and labor in the subsequent care of the crop. The most suitable means of irrigation is the border method, which consists in dividing the field into long, narrow strips by low, flat levees, extending in the direction of the steepest slope, and confining the water in a single strip. This method is well adapted to light soil, through which the water percolates rapidly.



"Mesgawi" Berseem Clover under Irrigation.

The soil, having been thoroughly broken up, the ground must be worked to a fine tilth, and a good, solid, firm seed bed prepared, whether the crop is to be grown with or without irrigation. **TOO MUCH CARE CANNOT BE GIVEN TO THIS DETAIL.** A good, fine seed bed is absolutely essential for Berseem. (See No. 9 on page 94 for opinions of growers of Berseem.)

Where fertiliser is necessary, from 112 to 224 lbs. of Bone Dust and Superphosphate mixed per acre is the most suitable manure. Superphosphate alone will give the results, but the inclusion of the Bone Dust helps to maintain the soil for a succeeding crop, especially where it is not intended to plough the Berseem under for green manure.

FODDER CROPS FOR AUSTRALIA

"MESGAWI" BERSEEM CLOVER. (Continued.)

TIME AND METHOD OF SEEDING.—To obtain the maximum results, early sowing and thick seeding is necessary. Where possible, sow in February, but certainly not later than the end of March, or in warmer districts, the middle of April, although Berseem will give very fair results in districts with a mild Winter, seeded even as late as the middle of May. Where irrigation facilities are available, early planting can be carried out, watering the ground first, then drilling in the seed. Be careful to sow shallow, as deep seeding means a poor stand and weakly, stunted plants. It is especially necessary, when drilling, to be careful not to sow too deeply. The methods of seeding Lucerne apply equally to Berseem. (See page 99.)

Berseem also gives very good results broadcasted, and it is doubtful which is the better method. As the plants require a fair amount of moisture, the seed can be either drilled or broadcasted in districts with a good, regular rainfall or where irrigation is available, but in dry districts, without irrigation, where the rainfall cannot be relied on, it will perhaps be better to drill, sowing a little thinner in rows at least 8 inches apart. The Cahoon Hand Sower is a particularly good machine for broadcasting Berseem seed, and gives very good results in this direction.

The quantity of seed per acre is a question on which there has always been a considerable diversity of opinion, and the reader is referred to No. 8 on page 93 for views of successful growers of Berseem on this matter. For grazing, 8 to 10 lbs. of seed per acre, in drills 7 to 8 inches apart, will generally give the best results, while for cutting for hay, it is advisable to sow more thickly, using from 12 to 15 lbs. of seed per acre. Sowing broadcast, from 15 to 20 lbs. per acre will be found an ample seeding under most conditions. Be careful not to sow the seed too deep.

The reader is requested to read the opinions of successful Berseem growers on page 93, but must use his own discretion in this matter, and by studying the moisture conditions and working on the basis of 8 to 10 lbs. in drills per acre, and from 15 to 20 lbs. per acre broadcasted, will soon ascertain, without difficulty, the minimum quantity that will yield the maximum results, under his own particular soil, moisture, and climatic conditions.

After the seed has been sown, whether broadcasted or drilled, the ground must be rolled to firm and compact the soil around the seed. **This rolling after sowing is imperative.**

SUBSEQUENT TREATMENT.—The seed is not long in germinating, providing there is sufficient soil moisture, and when sown in the Autumn, while the ground is still warm, the young seedlings grow rapidly. In the first growth, Berseem sends up a single stem, carrying several leaves, but no lateral branches. When the plants are from 9 to 12 inches high, it is advisable to make a cutting, and by the time the Clover has arrived at this stage, three or four side shoots will appear at the base of the original stem. The cutting encourages the growth of these side shoots and causes the plant to stool out, and the necessity for this early treatment will now be apparent.

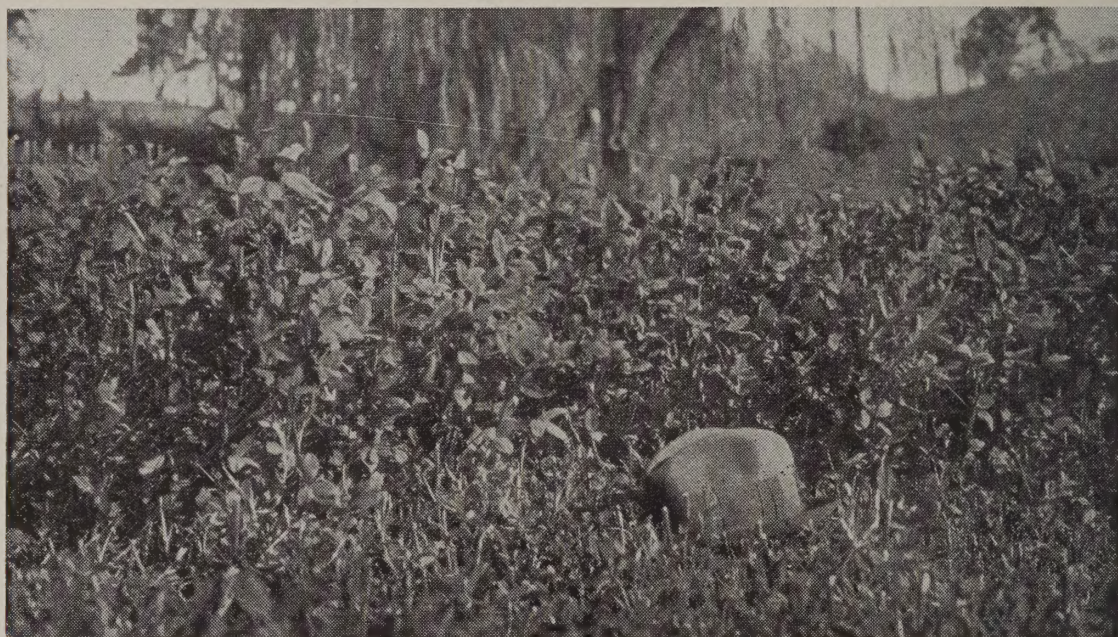
After this has been taken, the side shoots grow rapidly and replace the first stem, so that under satisfactory conditions, the second growth will be much thicker, and denser, and will give a much heavier bulk of feed than the first. Four, five and six cuttings will be secured in a single season, especially where the Berseem is grown in districts with a mild Winter, either under irrigation conditions or on moist ground.

While Berseem is quite suitable for pasturing, the animals are apt to trample down and destroy the plants, thus reducing the yield and materially shortening the period of usefulness of the crop, and for this reason, it is better, where possible, to cut and feed, rather than to graze the Clover. Berseem makes very fair quality hay, but for this purpose, gives much better bulk grown in mixture with an annual grass, such as Italian Rye Grass, or with one of the Winter feed grains, as described in the succeeding paragraph.

COMPARATIVE FEEDING VALUES, SEE PAGE 68

“MESGAWI” BERSEEM CLOVER. (Continued.)

BERSEEM IN MIXTURES.—Berseem Clover is well adapted to growing in mixtures for Winter feed, and gives excellent results grown in conjunction with Skinless Barley, or with Rye Corn and Algerian Oats, mixed, while Berseem Clover, Skinless Barley and Italian Ryegrass, or Italian Ryegrass and the Clover by themselves, will also give very satisfactory results. These mixtures are useful, either for grazing, cutting to feed green, or for making into hay, as well as for ploughing under for green manure. Each mixture forms a well-balanced ration, and none of them are liable to cause “bloat.”



The above illustration shows portion of a stand of Berseem Clover grown by Mr. J. S. Hammat, Williamstown, S.A., who has been growing this fodder for seven years, and pronounces it as absolutely the best Winter-growing feed that he knows of.

The above crop was sown on March 11th, has been cut twice, and is now practically ready for a third cut. Mr. Hammat says: “The secret of success in growing this crop, is to have the seed in early.”

The photograph of the above was taken early in July, 1921, and we are indebted to the Mail Newspapers Ltd., Adelaide, for the use of same.

For warmer districts, especially with irrigation, the first two are recommended, while for the cooler parts of this State, the two latter, sown early, would be preferable.

The correct proportions per acre of these mixtures, together with fuller details of their special requirements, are given in a subsequent section. (See pages 124 to 127.)

Key to Indicator Letters for Opinions of Growers on Pages 91 to 94.

To obviate repetition and to economise in space, the names of the gentlemen whose opinions on “Mesgawi” Berseem Clover appear on pages 91 to 94 are indicated by a key letter. As a guarantee of genuineness, the full names, addresses, and dates are shown below.

- A. David Wighton, Springhurst, 3/7/21.
- B. W. J. Spackman, Long Flat, Murray Bridge, S.A., 24/6/21.
- C. E. Knight, Glenhope East, via Mia Mia (about 20 miles from Kyneton), 28/6/21.
- D. H. C. Prosser, Mypolonga, S.A., 28/6/21.
- E. H. W. Smith, Whroo Pte. Bag, Swan Hill, 28/6/21. (Late of Brandy Lake, Kerang.)
- F. A. W. Glass, Messrs. Glass Bros., Nanneella, 26/6/21.
- G. F. J. Jury, Mypolonga, S.A., 4/7/21.
- H. J. Eagle, Murray Bridge, S.A., 27/6/21.
- I. G. E. Bagot, Monteith, S.A., 20/7/21.
- K. P. H. Pickering, Mypolonga, S.A., 29/7/21.

FODDER CROPS FOR AUSTRALIA

READ THE FOLLOWING EXPERIENCES OF PRACTICAL GROWERS OF "MESGAWI" BERSEEM CONCERNING THE REASONS GIVEN IN THIS BOOKLET FOR PLANTING THIS SPLENDID WINTER FODDER.

No. 1. Grows in Winter like Lucerne in the Summer?

- A. I quite agree with Reasons Nos. 1 to 4 as far as my experience goes.
- B. Yes, if sown early enough to get a good growth before the cold weather sets in. To secure a good Winter growth you must sow early in the warm weather and get it established before the cold weather sets in, and then it will grow in Winter.
- C. Yes.
- D. My opinion is that if you want Berseem for a Winter feed you must plant it early to get it established before the cold weather sets in, otherwise it will not grow until the warm weather. I consider it grows quicker than Lucerne.
- E. I quite agree. Early sowing is essential for Winter feed. By the middle of February if possible.
- F. I think your reasons are good.
- G. It does not grow here in the mid-Winter like Lucerne in the Summer.
- H. It will not do well in all districts on our swamps. It does very well in Spring, grows very strong, but in Winter grows very slowly. North of Adelaide it makes good early growth in Winter. You have to find out where it suits.
- I. When I was at The Roseworthy Agricultural College we grew Berseem there, and it grew all through the Winter, but the last two years, I have had a block here and am one of a few who try to grow it. It is a little too cold for Berseem on the swamps, and consequently, it does not grow as it should until the warmer weather sets in. Last year I had my fifth cut in December. Although the Berseem is growing at its best when the Lucerne is growing again, it comes in very handy, as it enables one to start the Lucerne hay stack for the following Winter.
- K. Not quite up to the growth of Lucerne in mid-Winter, but quite equals it after mid-Winter.

No. 2. Can be Pastured, Cut for Green Feed, or Made into Hay?

- A. See answer to No. 1.
- B. If wanted to graze, it is better to cut the first growth.
- C. Yes.
- E. Have never made it into hay, but am sure it would be good. I have 80 to 90 acres this season from seed supplied by you. It looks splendid at present. I have 2,200 sheep on it.
- F. I think your 7 Reasons are good, but you can hardly make good hay of it successfully in the Winter.
- G. I do not think it could be pastured; the plant is too tender. Makes the best of green feed; not much for hay, dries up too much.
- K. Cannot agree with the pasturing or hay-making under irrigation, but is unequalled for green feed.

No. 3. Cleanses the Land, as the Cutting Destroys the Weeds?

- A. See answer to No. 1.
- B. Yes, and if a good germination is secured it will choke out most of the weeds.
- C. Yes. E. Yes.
- G. It is real good for cleaning the land and smothering the weeds.
- K. Absolutely cleanses the land, as its prolific growth gives nothing else any chance.

PERMANENT PASTURES ARE A VALUABLE ASSET

No. 4. Yields up to Six Cuttings in a Season?

(Six cuttings are not exceptional. See "K," and Mr. W. G. Burridge's experience on page 87.)

- A. I have no doubt with a good rainfall and fair quality land it could be cut six times, but in our district, it is always too dry in the Winter.
- B. Yes. Must be on good ground and sown early to get six cuts.
- C. Have had four cuttings.
- E. Yes, if sown early. F. See answer to No. 1.
- G. The first year I planted it on the 31st of March, using 12 lbs. of seed and 160 lbs. Superphosphate per acre, drilling two ways. I had five cuts and also a little grazing. One little corner, which I cut only three times, and which grew very rank, went down very bad, so I measured some of the stems when straightened out, and they were 5 ft. 9 in., but the plants did not grow after. The second year I used 14 lbs. of seed, and 160 lbs. of Super., sowing two ways. I got five cuts and a little grazing. Date of sowing, 16th March. This year I used 20 lbs. of seed and 160 lbs. of Super., sowing on the 16th February. Up to date I have had 2 good cuts off a portion of it; one small patch, which I used for a stall-fed cow, I cut with a scythe, cutting four cuts, taking the first cut eight weeks from planting.
- I. Last year, I had my fifth cut in December.
- K. It certainly is unequalled as a predecessor to Lucerne, as it leaves the soil in splendid condition, and there are no objectional roots to spoil the tilth of the soil. If seeded early, quite six cuttings can be got, and very often seven, in the season. I have had seven cuts in the season, with but one irrigation, and that, to germinate the seed when sown.

No. 5. Does Not Cause Bloat?

- A. No. I always believe in thin sowing for grazing, both for Lucerne and Clovers, as there is not so much risk in the cattle bloating.
- B. It will bloat, but nothing to hurt, providing you see that your cows are not empty when turned on it, and not put on when it is dewy.
- C. No.
- D. I have never known Berseem Clover to bloat any of my cows. I have grazed them on it and fed it to them as much as they will eat at a time, but I always give them a feed of chaff or hay before putting them in on the Berseem.
- E. No, have grazed horses, sheep and cattle at all stages and weather.
- F. No, never!
- G. I have never had a cow bloat on Berseem Clover, and have given the cows at times all Berseem.
- H. No. I. No. K. Never!

No. 6. Do You Consider It a Valuable Winter Feed?

- A. Yes. B. Yes. C. Yes.
- D. As a succulent green feed for milch cows in the Winter, I reckon there is nothing better, providing one has hay or chaff to feed at night, otherwise there is not enough body in it for cows alone. It scours too much by itself. I certainly recommend anyone who is dairying to give it a trial, and provided they get it established before the cold weather sets in, it will repay them handsomely for their trouble. Personally, I would not be without it for dairying or pig feed, for slips or breeding sows, and my sows get nothing else till near farrowing.
- E. It is the best I know. F. Yes.
- G. Good Autumn and early Spring feed, but does not grow here in mid-Winter.
- H. Yes, when climatic conditions suit.
- I. Yes, to a certain extent, but does not start growing rapidly until August.
- K. This is my fourth season of growing Berseem Clover, and I consider it the most valuable Winter crop I have seen growing.

FODDER CROPS FOR AUSTRALIA

No. 7. In the Event of a Dry Winter, is Berseem adversely affected, and will it stand a Temporary Absence of Moisture during this period of the year?

- A. I think it would stand a fair absence of moisture.
- B. What I have sown is on reclaimed Swamp land, and will stand a long dry spell there.
- C. Must have a certain amount of moisture. Will stand irrigation.
- D. Last year I planted in March on Swamp land, and it was a very dry Winter, and I had good returns from it right up till the end of November, but it did not get away until July, owing to the cold at first. From then on it did remarkably well.
- E. Yes, this year I have 80 acres sown where I had oats last year. A lot of self-sown Oats came, and during a dry spell turned yellow—Berseem not affected.
- F. Does best in a dry Winter.
- G. It will not stand too much moisture in this district on the swamp.
- H. It waits a fair amount of moisture.
- I. Grown on the Swamp it requires very little water.
- K. Providing Berseem is sown early, and there is sufficient moisture to get a good start, it is not adversely affected by a dry Winter.

No. 8. Do You prefer sowing Broadcast or in Drills, and What Do You consider the Minimum Quantity of Seed per acre to secure a good stand?

- A. For cutting for hay, 12 to 15 lbs. would make a nice crop, but for grazing I would prefer it a bit thinner, as I always believe in thin sowing for grazing, both for Lucerne and Clovers, as there is not so much risk in the cattle bloating.
- B. I always drill and use Superphosphate, and drill it two ways. I have never broadcasted any.
- C. Have only sown broadcast, which does well—about 10 to 12 lbs. of good seed per acre. I sowed Berseem seed, mixed with Superphosphate this year at the rate of 30 pounds to the acre, broadcast. This grew splendidly, and is now about 18 inches high, and very dense.
- D. I have only broadcasted, not drilled, so could not give an opinion which method is the better; but personally, I prefer all small seed broadcasted. Last year I sowed 15 lbs. of seed to the acre, and had a splendid germination, almost too thick, but the early frosts took a lot of it. This year, I sowed the same in a good seed bed, but have had a poor germination.
- E. Have only grown it broadcasted. I have a magnificent stand this season on a twelve (12) pounds per acre seeding.
- F. Sow with ordinary seed drill at the rate of 10 or 12 lbs., just deep enough to be in the moist earth. Almost impossible to get a good strike broadcasted in February, the seed is so near the surface. It dries out before the plants can get established.
- G. I prefer drilling. The drill I use is 8 inches between each drill. I drill seed in two ways, using 10 lbs. of seed and 80 lbs. of Super. each time per acre. I have never tried broadcasting. I let the drill pipes hang loose behind the disk.
- H. Have had good results from drilling. I have not broadcasted Berseem, but it should give good results.
- I. Broadcasted in the Swamp land, as there is so much Dandelion grows there, if the Berseem does not get a good start, and choke it. I haven't tried less than 15 to 20 lbs. per acre.
- K. I have found cross-drilling the best method. This season I broadcasted, but as yet have not been too well satisfied. My drill sows 7 inches apart, and I use from 25 to 30 lbs. per acre. I have found thin sowings to be more susceptible to adverse conditions. I would not recommend less than 30 lbs. per acre sown broadcast, but I prefer the drilling.

KEEP YOUR LAND FERTILE. SEE PAGE 21

No. 9. Do You Consider any Special Soil Preparation is necessary?

- A. I consider a deep ploughing with a fine seed bed is the best.
- B. I always work the ground down to make a good solid seed bed, and water the ground first, then drill in.
- C. I top-dressed a silted flat with fowl-house manure, which gave the best results.
- D. I consider on Swamp land that it is necessary to thoroughly prepare the seed bed; that is, get it nice and fine, and level, to get the best results and the most even germination. If ground is too rough and cloddy, the seed gets buried too deeply, and if it comes up, is weakly. If the seed bed is fine, just use a horse rake over it a couple of times, then roll.
- E. Yes, the soil must be ploughed deep, and worked to a fine tilth.
- F. Berseem does not do very well on heavy land, in wet Winters it wants light, loamy soil. Thorough soil preparation is essential.
- G. I think the soil should be prepared to as fine a tilth as possible. I rolled the land three times, harrowed three times, and drilled twice, not harrowing after drilling, but rolling.
- H. Yes, necessary to work it fine, and I think it wants good soil.
- I. No, just working soil to fine tilth being small seed, and drill in Lime or Super.
- K. The soil requires to be fine, otherwise much seed is wasted. I always drill in shallow and roll after. The rolling I consider absolutely necessary.

HUBAM

THE NEW ANNUAL WHITE-FLOWERING SWEET CLOVER.

The many glowing reports received from America regarding Hubam make this new introduction worthy of very mature consideration, but, while the plant manifests very valuable features under the conditions prevailing in the United States, it has yet to be proved that it will yield the same results under Australian conditions, and that it is going to do anything more than those annual Summer fodder and soil-improving plants already well known and proven here.

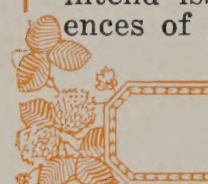
Before introducing Hubam to Australian farmers, Messrs. F. H. Brunning Pty. Ltd. have arranged for a series of experiments to be carried out in various parts of Victoria, as well as in South Australia and Tasmania. The results of these experiences under local conditions will be available by April or May, 1922, and if the reports received (the trials are being made by practical well-known successful farmers) justify, Hubam will be offered for sale from August, 1922.

Hubam is not frost-resistant, and the seed is sown in the Spring, about the same time as Sudan Grass, Maize or Millet. It will not grow in acid soil, and precautions must therefore be taken to see that the ground is sweet, applying a dressing of lime where necessary. (See pages 40 and 41.) Prepare the soil in the same manner as for Lucerne or Melilotus Alba, using Superphosphate where fertilizer is needed.

Sow the seed thinly in rows varying from 18 inches to 36 inches apart, according to the Summer rainfall. As Hubam is such a high-priced seed at present, to distribute evenly it is advisable to mix through with some other seed of similar size, such as White Millet, Lucerne screenings, etc., which has been deadened through baking in an oven, using 1½ lbs. of this deadened seed, and 1½ lbs. of Hubam per acre.

The principal treatment is frequent cultivation to conserve the soil moisture. The chief value of Hubam is as a Summer fodder, and a quick soil improver. It builds up soil fertility in a short period, and fits in the rotation between two Winter grain crops, renewing the ground after the former and putting it in good heart for the latter.

Should Hubam prove suitable for this country, Messrs. F. H. Brunning intend issuing informative literature on Hubam, based on the actual experiences of practical men during season 1921-22.



INSURE AGAINST DROUGHT. INSTALL A SILO



LUCERNE

Lucerne is, perhaps, one of the most widely cultivated of fodder plants, and certainly one of the oldest known, as it is recorded in ancient history as far back as 490 B.C. Lucerne is grown in parts of Canada, throughout the United States, in Mexico, in many parts of South America, in Northern Africa along the Mediterranean shore, in South Africa, throughout Southern Europe, in practically all parts of Asia, and is one of the leading fodder crops in Australia. The acreage in Australia under Lucerne is gradually but surely increasing every year, as the suitability of this fodder plant to districts, where it has not been previously grown, is being definitely established.

Lucerne is a long-lived plant, and instances have been recorded of its living for over 200 years without replanting, but generally, its life varies from 10 to 25 years, according to the soil and the treatment given.



Lucerne Growing at Werribee.

CLIMATIC AND SOIL CONDITIONS.—Lucerne, though perennial and so prolific in habit, requires for its successful cultivation, certain definite conditions; it will thrive in a variety of soils, under extremes of heat and cold, and under a greater range of annual rainfall than many crops will stand, but the plant requires well-drained, deep soil, to establish its wonderful roots, and “Lucerne will not stand wet feet.” It has an extraordinary partiality for Lime, and providing this element is present, will, on soils poor in nitrogen, readily supply this deficiency by the presence in the soil of those mysterious bacteria which take up the nitrogen from the air, and so transform it into plant food. It is unwise for a farmer to conclude that Lucerne will not grow profitably on his land, or that it is not suitable for the local conditions without making at least a small experiment, as very often failure is due to lack of lime in the ground, or to bad drainage, rather than to adverse climatic conditions. Lucerne thrives on a very wide range of soils, although the maximum results cannot be expected from land unsuitable to the essential qualities of the plant.

Lucerne, of course, will not grow without moisture, and if the rainfall is insufficient and cannot be supplemented by irrigation, heavy or even good yields are out of the question. Before deciding that a district is too dry for Lucerne, the question “What permanent pasture fodder will do better?” should be answered. If rain does not fall at the right time, other crops fail,

ENSURE GOOD RESULTS BY USING BRUNNING'S SEEDS

LUCERNE. (Continued.)

but Lucerne, once deeply established in the soil, awaits the opportunity, and when the rain does come, immediately starts growing vigorously.

Payable results may be expected from Lucerne on almost any land of fair quality, except badly drained or very sandy ground. It must be remembered, however, that the plant roots very deeply, so that a deep, permeable subsoil is essential to maximum results. **This is not an absolute essential to successful growth, as was once supposed.**

The heaviest yields are obtained on the very best alluvial soils, found on river banks, particularly on deep, free soils, well supplied with lime and potash, and with free water 15 to 30 feet below the surface. A farmer possessing such ground will find it hard to discover a more profitable use for it than sowing down with Lucerne. The suitability of Lucerne to such a soil is the secret of success of the N.S.W. Lucerne growers in the Hunter River, Tamworth, and Moree districts of N.S.W., where comfortable livings are made on 30-acre paddocks, and where first-class Lucerne land brings upwards of £100 per acre.

DRAINAGE.—Thorough and adequate drainage is absolutely essential to the success of Lucerne, and if the soil is not naturally drained to a depth of at least several feet, this deficiency must be attended to, before Lucerne-growing is attempted. Where badly drained patches occur in a field, it will be noticed that the Lucerne soon dies out, and is replaced by weeds. The plants are not affected by flood water, unless submerged for some time, but water must never be allowed to lie on Lucerne for any length of time, and to cover a field for 2 or 3 days will surely mean killing it out.

SOIL PREPARATION.—It must be remembered that Lucerne can be grown successfully under several distinct conditions:—In dry, arid areas, where climatic conditions are suitable and irrigation facilities to supply the necessary moisture are available; on deep river flats, with water from 15 to 30 feet below the surface and on good, suitable land in districts such as Gippsland, with a good Summer rainfall. Lucerne might also be grown with fair success in dry, arid districts, with a limited Summer rainfall, providing frequent cultivation were practised, but it will generally be found more economical under such conditions to grow a more thoroughly drought-resistant annual fodder, such as Japanese Millet or Sudan Grass, and to re-sow every year. Whether Lucerne is to be grown with or without irrigation, thorough soil preparation is absolutely essential.

A good method of preparing the soil for Lucerne is to grow some leguminous crop, such as Berseem Clover or Sweet Clover, for ploughing under for green manure, and this has a double value, especially in good soil. The better the soil, the greater the growth of weeds, and during the earlier stages of growth, the young Lucerne seedlings progress very slowly, and are apt to be choked with weeds, especially when the seed is sown in the Autumn, or in a very moist Spring. The preceding leguminous crop sown can either be pastured or cut for green feed, thus keeping down the weeds, and when ploughed under for green manure, adds to the soil the available nitrogen and humus so necessary for the success of the crop. For Spring sown crops, one of Brunning's Four Purpose Crop Mixtures, "Mesgawi" Berseem Clover, or Field Peas, are good for this purpose, but where it is required to seed in the Autumn, there is nothing more suitable than Sweet Clover, whose roots decay quickly, adding very much to the available humus in the ground. When preparing the soil in this way, it is necessary to be careful not to leave the ploughing under too late, especially if done in warm weather, as fermentation hurtful to the Lucerne seed may commence.

The subject of drainage has already been discussed (see page 96), and it must be distinctly remembered that any attempt to grow Lucerne on badly drained land is a waste of time and money.

Especially where Lucerne is to be grown under irrigation, must the land be levelled off evenly, and no hollows left, or they may become filled with stagnant water, which will result in patches of the Lucerne dying out. One of the best implements for levelling, and the one mostly used in California, U.S.A., and in Victoria, is the buckscraper. Any blacksmith can easily make the necessary iron work, and the woodwork can be put together by any handy man. The buckscraper, which is a very handy scoop for all general



BRUNNING'S "STANDARD" LUCERNE IS UNEQUALLED

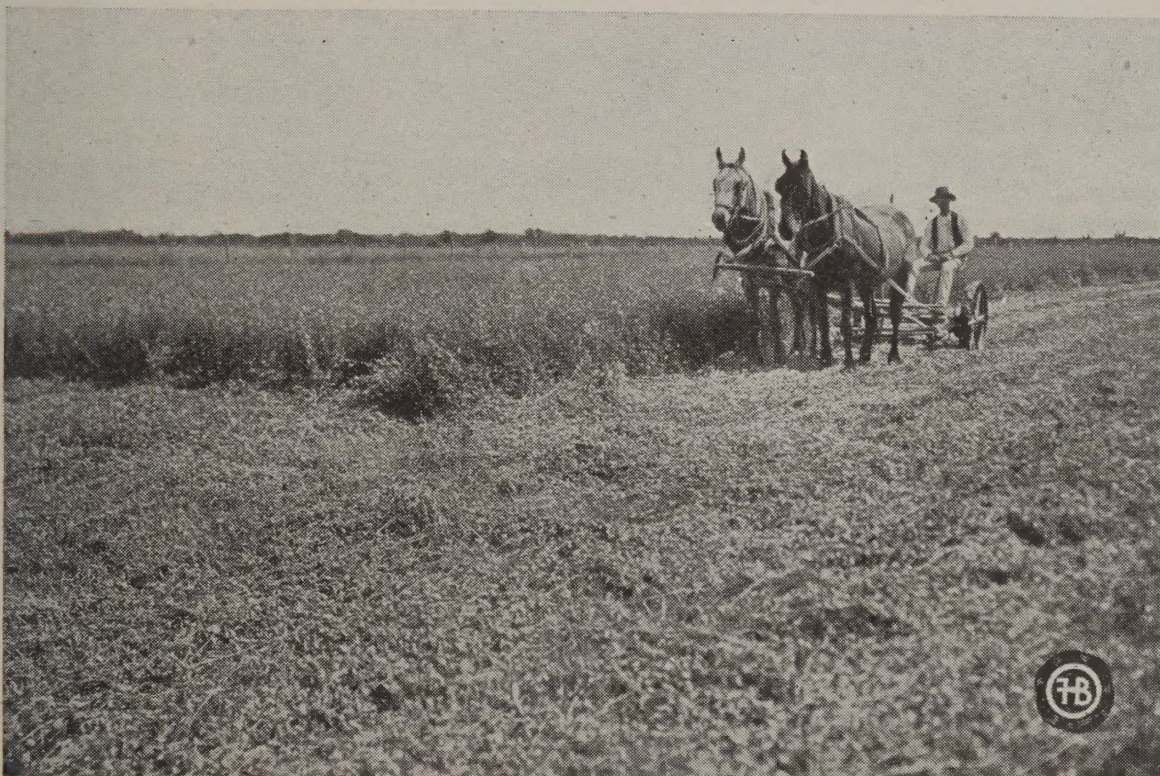


FODDER CROPS FOR AUSTRALIA

LUCERNE. (Continued.)

uses, may be made in two sizes—the smaller size, 4 feet long, for two horses, and the larger size, 7 feet long, for four horses.

Lucerne prefers ground which is neutral, or slightly alkaline, and will not succeed on sour soils, or those which have a strongly acid reaction. Acidity occurs in worn-out soil, which has been cropped for many years in succession, and in sour or badly-drained ground. The free growth of sorrel is an almost certain indicator of this condition. Should there be any doubt as to the condition of the soil, it is always advisable to make a test with blue litmus paper (see page 41), and if the need of Lime is indicated, it is useless attempting to grow Lucerne without. The method of application is shown on page 41.



Cutting a Good Stand of Brunning's Lucerne.

Lucerne is a deep-rooting plant and although its roots have great penetrating power, the plants will thrive better, and a better stand will be obtained, by the deep stirring of a stiff subsoil. Plough as deeply as possible, without bringing clay to the surface, and follow in the furrow with a subsoiling plough, set from 12 to 14 inches deep. This depth of loose soil will enable the young plants to root well, and where irrigation is practised, will enable the applied water to soak down. Bacterial action, so essential to the healthy growth of Lucerne, takes place chiefly within from 12 to 24 inches below the surface, hence the necessity of having this layer of the soil in good physical condition.

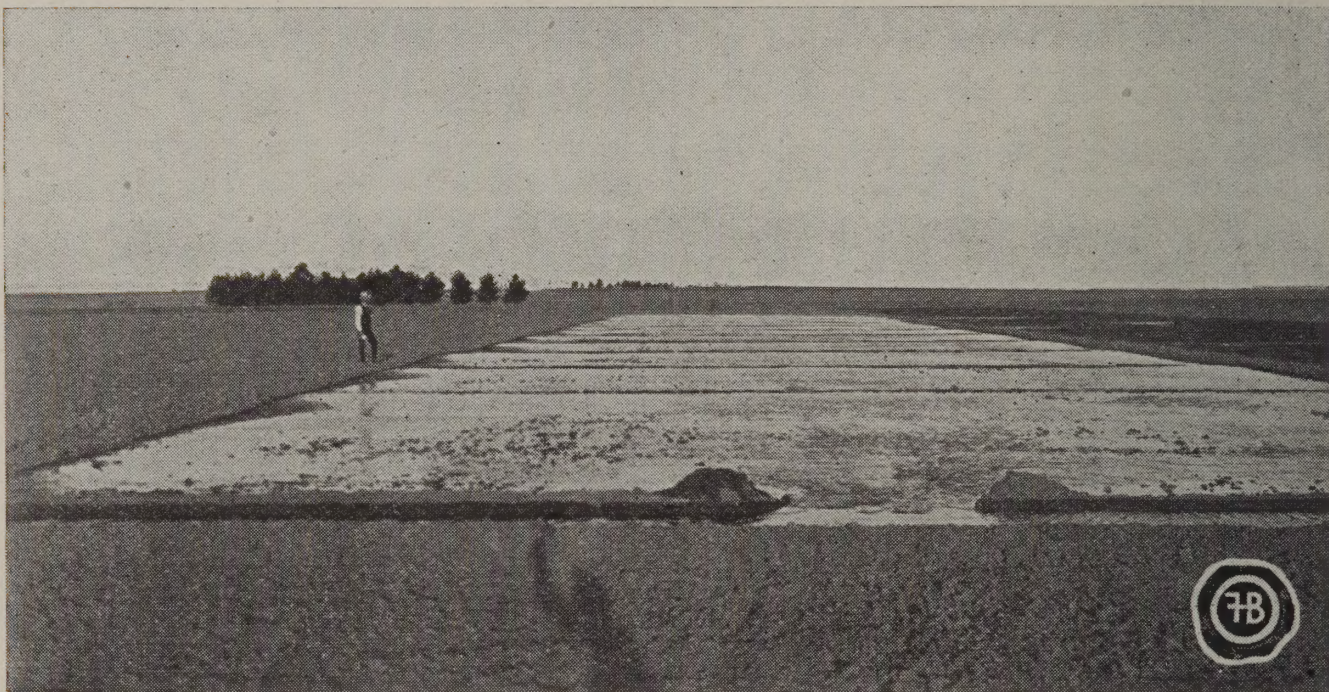
Just before the seed is sown, plough the land again lightly, then harrow and roll. A firm, fine seed bed is necessary, and to bring the soil to the necessary fine tilth, it may be necessary to roll twice. When broadcasting the seed, run a pair of harrows lightly over the compacted soil just prior to seeding. If weeds or grass are still present, they should be worked out with a spring-tooth cultivator, and removed. The ground will then be ready for sowing the seed.

METHOD OF LIMING.—If Caustic Lime is used, it must be slaked before being applied to the soil, or it will burn out the vegetable matter and humus, with which it comes in contact. The best method is to distribute it in heaps upon the ground, mix with a little earth, and allow it to air-slake before spreading it on the soil. Plough the soil a couple of months before sowing, and place the lime on it in heaps. After it has thoroughly slaked,

KEEP YOUR LAND FERTILE BY SUPPLYING HUMUS

LUCERNE. (Continued.)

spread with a shovel and mix with the surface soil with the disk cultivator or harrows, continuing the cultivation at intervals until time of seeding. Lime must only be worked into the surface, and never ploughed into the ground. Finely-ground limestone rock, in the form of carbonate, is also largely used, and may be distributed immediately before seeding. All Lime has to become converted into carbonate in the soil before it will do its work.



Irrigation, showing how Cross Check Banks assist in securing an even distribution of water.

FERTILISER.—Artificial fertilisers are required on ground which has become exhausted by cropping, or is naturally poor. The crop makes heavy demands on the soil, and its fertility must be maintained. Green manuring in the first place can be thoroughly recommended, while top-dressing with superphosphate or basic slag every year is a sound and remunerative practice.

TIME OF SOWING.—Lucerne seed may be sown both in the Spring and the Autumn, according to the rainfall, the climatic conditions, and whether irrigation is available or not. Where irrigation is not available, Autumn sowing is the best for hot, dry districts, having a light Summer rainfall and a mild Winter; where facilities for artificial watering are available under such climatic conditions, seeding may be carried out either in the Autumn or Spring, although the latter is, if anything, preferable, as with the advent of warm weather, the young Lucerne plants grow rapidly, and soon out-distance any weeds that may have survived the preparatory cultivation of the ground.

For districts such as Gippsland, with a colder Winter and a more regular Summer rainfall, Spring sowing will generally give the best results, but it does not necessarily follow that this rule is invariable, and splendid stands have been secured both there and in the Western District of Victoria, from early Autumn seedings.

Sowing, however, must be carried out early, so as to allow the young plants to become thoroughly established before being called on to withstand cold weather, and where circumstances necessitate late Autumn seeding in such districts, it is advisable to make a light seeding of Algerian Oats as a nurse crop, although practical experience has demonstrated that, except under a few special conditions, it is better to sow Lucerne without a nurse crop.

BUY YOUR SEEDS FROM THE LEADING HOUSE

FODDER CROPS FOR AUSTRALIA

LUCERNE. (Continued.)

On the other hand, although Spring seeding is preferable in the Northern areas of Victoria where irrigation is available, seed sown in the Autumn enables the plants to become thoroughly established during the Winter and early Spring, before being called on to withstand the dry Summer weather, and to a great degree economises in the number of irrigations necessary. Another advantage is that an Autumn sown crop in these districts can be utilized to a considerable extent during the first Summer, while Lucerne sown the previous Spring must be treated lightly until more thoroughly established.



Lucerne and Dodder.

QUANTITY OF SEED.—The better the conditions, the more seed required per acre, as on good soil with abundant moisture, plants far apart produce coarse, woody stems, and the greatest value of Lucerne is in the leaf.

For dry districts, without irrigation, thin seeding gives the best results, and 3 to 4 lbs. of seed per acre, drilled in about 9 to 12 inches apart, will permit of frequent cultivation, and give good results.

The quantity of seed also varies according to the quality, as will be judged from the remarks on page 101, under the heading of "The Necessity for Using only Good Lucerne Seed," and the reader is referred to this article for fuller particulars. The quantity also varies with climatic and soil conditions, and each particular case must be decided on its merits, remembering that the better the soil, and the more favorable the conditions, the greater quantity of seed required.

METHOD OF SOWING.

Lucerne seed may be sown both broadcast and in rows. Broadcast sowing enables the plants to cover

the ground evenly, and gives the weeds a lesser opportunity of obtaining a foothold and for many reasons is preferable to drilling, but of course more seed is required per acre than when sown in rows. The most economical method of broadcasting Lucerne is the Cahoon Hand Seed Sower, which will broadcast evenly any desired quantity of seed at the rate of from 4 to 6 acres per hour.

On the other hand, broadcast sowing precludes the possibility of cultivation, and is only feasible where irrigation is available, or in districts with a good Summer rainfall. Seed, except in very dry districts and without irrigation, is now more uniformly sown in rows about 7 inches apart, using a seed drill, and by this method less seed is necessary per acre, and cultivation may be more easily practised.

Deep seeding is not conducive to good results, and care must be taken when drilling Lucerne seed to see that it is not planted too deeply, as even if only covered very lightly, it must lie in a furrow, and beating rain may wash the ground over it, burying it to too great a depth. It is, therefore, always necessary to be careful to sow shallow when drilling. After seeding has been completed, whether broadcasting or drilling, it is necessary to roll to compact the soil around the seed, and **THIS ROLLING AFTER SEEDING IS ESSENTIAL TO SECURING A GOOD STAND.**

BRUNNING'S SEEDS STILL MAINTAIN FIRST PLACE

LUCERNE. (Continued.)

SUBSEQUENT TREATMENT.—After the seed is sown, the weeds must be kept in check, and while a light harrowing might be of advantage, it is always risky at this stage, and must not be attempted until the Lucerne roots have obtained a fairly firm hold. The best method of checking early weeds, which compete with Lucerne, is to mow frequently, putting the mower over the crop before any of the weeds have commenced to seed and, if necessary, repeating the operation about a month afterwards.

Make the first cut before the Lucerne has reached the flowering stage, as in addition to keeping down the weeds, early cuttings help to establish the roots, and to make the plants stool out. The first cutting makes excellent hay, or can be used for green feed, as required. Do not mow too close to the ground at any time, but always leave a few leaves. After the second cutting has been taken, particularly on ground which sets hard, the harrow can be used. It is not advisable to pasture Lucerne at this stage.

CARE OF ESTABLISHED CROPS.—When thoroughly established, Lucerne thrives on very frequent cultivation, and from the time the plants are two years old and onwards, cultivation can be carried out very freely, using a disk harrow with the disks set rather straight and the harrows weighted to cause them to sink to the right depth. This cultivation is valuable in conserving moisture, as the loosening of the surface allows the water or rain to percolate to a greater depth, and prevents waste by running over the surface, as well as minimising loss through possible evaporation.

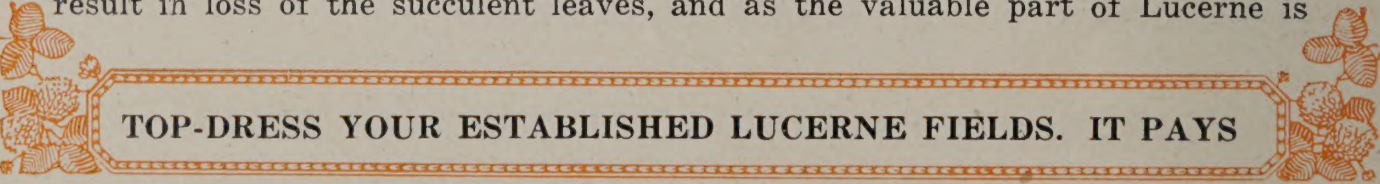
Cultivation also thickens the crop, as the splitting of the crowns by the disk harrow encourages stooling, and no fear need be entertained that the operation at this stage will injure the plants, as they are too strongly rooted to be harmed by surface cultivation. Where a disk harrow is not available, an ordinary spring tooth cultivator can be used just as effectively, and for moist ground one fitted with special narrow tines is most satisfactory.

In districts where irrigation facilities are available, it is a good practice after feeding down the Lucerne and giving it an irrigation, to broadcast a bushel of Algerian Oats per acre in the crop. A deep scarifying will suffice to cover the Oats, which will grow up with the Lucerne, thus providing an abundance of useful fodder during the Winter, when the latter is dormant, while if stock are removed from the field in September, and the crop permitted to mature, the Oats can be cut for hay and make a valuable reserve of fodder for any kind of stock. The best time for sowing the Oats is in the early Autumn. After cutting the oaten hay, irrigate the ground and scarify again. The cultivation and the Oats help the Lucerne, while the Oats grow more freely, owing to the fertilising qualities of the latter.

IRRIGATING.—In irrigation districts, it is advisable to first water and then sow the seed, and before irrigating again to allow the plants to attain a fair height. By this means, a better and healthier stand is obtained than by watering soon after sowing, especially when seed is sown during the dry months of the year. Let the Lucerne stand 5 or 6 weeks after sowing, if possible, before irrigating again. Irrigate a week before and, if required, a week after each crop is cut, but avoid watering when there is no foliage to protect the ground. The quantity of water supplied should be equivalent to a rainfall of from 3 to 5 inches, according to the nature of the soil. Do not irrigate Lucerne in the Winter and early Spring, and wait until it has started to grow before applying water in the Spring.

LUCERNE HAY.—The time to cut Lucerne for hay is just when it is coming into bloom, that is to say, not more than 10 per cent. of the crop should be in flower, and as at this stage the second growth is commencing to show, it is obviously unwise to destroy the basis of the succeeding crop. Experienced growers prefer to judge the time to mow their Lucerne by the height of second growth, which should not be more than an inch or two.

The first cutting of the season should take place before flowering has commenced. In warm, dry climates, cut, rake and put the Lucerne into stooks all in the same day, allowing it to remain in the stook for one day only (unless wet weather sets in) before proceeding with the stacking. Drying is a very rapid process in warm, dry climates, and delay will inevitably result in loss of the succulent leaves, and as the valuable part of Lucerne is



TOP-DRESS YOUR ESTABLISHED LUCERNE FIELDS. IT PAYS

FODDER CROPS FOR AUSTRALIA

LUCERNE. (Continued.)

its leaf, care must be taken in all haymaking operations to conserve the foliage. In moister climates, curing will of course take longer and allowance must be made accordingly. Stack the Lucerne under cover, as the quality of the hay is thereby improved.

THE NECESSITY FOR USING ONLY GOOD LUCERNE SEED

Good seed is equally as essential, or even more so, with Lucerne than with all other plants. Good seed with Lucerne means the best strain for the particular climatic conditions, seed absolutely free from dodder and other noxious weeds, and of good germination. There are many strains of Lucerne seed in commerce, these various strains being suitable to different climatic conditions. Some of the special varieties, such as Cossack, Grimm, Baltic,



Harvesting a 50-acre block of Lucerne at Werribee.

etc., are for extremely cold countries; whilst others are better adapted to more moderate temperatures. Many of these strains for special conditions are the only class of Lucerne that could be grown under such climatic conditions, and hence their use, in spite of the lower fodder yield. The strain which is so well and favorably known throughout Australia is the French Provence type acclimatised in the Hunter River, Tamworth and other Lucerne-growing districts in New South Wales. This is the broad-leaved, upright growing type, yielding a greater bulk of fodder than any of the other varieties, and as this particular French Provence type can be grown throughout Australia, there is no need to discuss any of the other special condition strains, as not only do they yield fewer cuttings, but a lesser amount of forage. New Zealand Marlborough grown Lucerne is also of this type, and is exceptionally well suited to many parts of Victoria.

In addition, therefore, to using the true, broad-leaved upright strain of the above type, the seed must be of good germination, and furthermore, CLEAN, that is to say absolutely free from dodder and other noxious weeds. The farmer knows the damage and injury done by dodder, but there are many other weeds to be found in uncleaned Lucerne seed, which are almost as dangerous. Farmer's Dressed Seed means, seed as received direct from the farm, without being screened or machine-dressed. Machine-dressed Seed means seed that has been cleaned once by machinery over a fine sieve. Brunning's STANDARD Quality Lucerne means seed that has been triple-

IT PAYS TO USE THE BEST SEEDS. SOW BRUNNING'S

LUCERNE. (Continued.)

machine dressed by the latest and most up-to-date machinery, and brought as near perfection as possible. All of Brunning's Lucerne seed is saved from dodder-free paddocks, **AND EVERY PRECAUTION IS ALSO TAKEN TO ENSURE THE ELIMINATION OF OTHER NOXIOUS WEEDS.**

Brunning's "STANDARD" Quality is the acme of perfection in Lucerne seed, and the highest grade obtainable, having under test a germination of over 98% and a purity of practically 100%. For the protection of purchasers, Brunning's "Standard" Quality Lucerne is only supplied in sealed calico bags, each containing 28 lbs. nett weight of seed, except where an odd quantity is required, when it is packed accordingly, but Brunning's "Standard" Quality Lucerne is never sent out unless under seal. Where a full sack of this Lucerne is ordered, six calico bags are packed in each double sack, making a total nett weight of 168 lbs. of seed per sack. Owing to the high purity and excellent germination, a lesser quantity of Brunning's "Standard" Quality Lucerne is necessary to sow an acre thoroughly than seed of lower quality.



Brunning's Special Lucerne Dressing Machine. The finest of its kind in Australia. Installed August, 1921.

The amount of Lucerne seed required to sow an acre varies according to the quality, soil and weather conditions. An average seeding of Farmer's Dressed seed is about 25 lbs. broadcast, and 15 lbs. per acre drilled, while of ordinary good quality M/D Lucerne, from 16 to 20 lbs. broadcast and 10 lbs. per acre in drills would be required for the same area.

THE VALUE OF BRUNNING'S "STANDARD" QUALITY LUCERNE is that sown in drills as small a quantity as 6 lbs., and with a careful and experienced man sowing, even 5 lbs. of seed will be quite sufficient for an acre, thereby effecting a saving in the amount of seed used, which means a lesser cost for seed per acre, as well as ensuring freedom from dodder and other noxious weeds. It is, however, a mistake to risk a good stand by stinting the seed, and unless the Lucerne grower has had sufficient experience in sowing to utilize the seed to the fullest extent, it is advisable to sow 6 lbs., but not more than 8 lbs. per acre, of this high-grade Lucerne. One gentleman in the Werribee district reports that he could sow an acre with as small a quantity as 2½ lbs. of Brunning's "STANDARD" Quality seed.

It will thus be easily understood that the quality of the seed makes a very considerable difference to the quantity required per acre.

BRUNNING'S LUCERNE SEED IS ALL QUITE DODDER FREE

GRASSES

GENERAL PERMANENT PASTURE GRASSES

The term "General Permanent Pasture Grasses" in this booklet includes those perennial varieties generally known as English Grasses, and some other largely used sorts, which cannot be correctly classed under that heading. Of the latter, the principal are *Paspalum Dilatatum*, Rhodes Grass, the Danthonias or Wallaby Grasses, Prairie or Rescue Grass, Couch or Bermuda Grass, *Phalaris Bulbosa*, and *Lolium subulatum* or Wimmera Ryegrass.

There are many other fodder plants commonly termed "Grass," for example, Sudan Grass and Johnson Grass, which do not come under this heading, and such of these included in this booklet are classified under their proper section. For the sake of simplifying classification, *Paspalum Dilatatum*, Rhodes Grass, the Danthonias or Wallaby Grasses, Prairie or Rescue Grass, Couch or Bermuda Grass and *Phalaris Bulbosa* are treated with separately, the other grasses, including the Ryegrasses (covering Perennial, Italian and Wimmera Ryegrass) being included under the heading of "English Permanent Pasture Grasses." The term English is hardly correct, but, being the generally accepted one, is used here for the sake of simplicity.

PASPALUM DILATATUM

(Golden Crown Grass.)

Paspalum Dilatatum is a native of South America, whence it was introduced into the Northern Rivers district of New South Wales many years ago, and in many instances has been the means of establishing the dairy industry there.

To quote the "Farmers' Handbook," 2nd Edition, issued by the N.S.W. Dept. of Agriculture—

"The history of *Paspalum Dilatatum* on the North Coast reads almost like a romance. In the short space of about twenty years, sleepy villages have been transformed into busy centres of thriving dairy districts, and land has increased tenfold in value; in short, the discovery of *Paspalum* has proved a veritable gold mine."

Paspalum Dilatatum is a perennial of strong, deep rooting habit, which enables it to become thoroughly established, and on moist ground, under favorable climatic conditions, it is rather hard to eradicate. It is of bunchy or tussocky growth, with leaves numerous near the ground, but very few on the stems.

There are several other species of the same family in cultivation in Australia, the best known of which is *Paspalum Distichum*, or Water Couch, a fairly useful plant for moist localities.

Two disadvantages of *Paspalum Dilatatum* are its tendency to spread on to ground where it is not wanted, and its excessive root development which, in time, mats the ground to such an extent that the grass is eventually choked and dies off. The former can easily be overcome by laying down only a limited area of *Paspalum Dilatatum*, and keeping it in check by sowing the nearby portions of the holding with other fodder crops, which require constant cultivation. Maize, Sudan Grass, or one of the Sorghums would be valuable in this respect, especially as the cultivation of these crops is carried out during the principal season of growth of the *Paspalum*. The excessive root development may be controlled by ploughing and cultivating, as recommended in the paragraph "Subsequent Treatment."

UTILIZATION.—*Paspalum Dilatatum* may be used both for pasture and as a hay grass. It is particularly suitable for grazing dairy cattle, can be pastured all the year round under reasonably congenial weather, with the exception of a short period during the Winter, and yields a large quantity


GROW "MESGAWI" BERSEEM FOR WINTER FODDER


PASPALUM DILATATUM. (Continued.)

of herbage, palatable to all kinds of stock. Being soft and succulent and not wiry, like many other grasses, cattle will eat every part of the plant, and when grown for permanent pasture it must be kept well eaten down to preserve its succulency and tenderness, and also to prevent it from growing into objectionable tussocks.

Paspalum Dilatatum may also be cut for hay, and *Paspalum* hay, especially when the plant is grown in mixture with one of the Clovers, is of very excellent quality. *Paspalum Dilatatum* is also fairly drought-resistant, although in such districts as the interior of N.S.W., where irrigation is not available, Rhodes Grass, Sudan Grass, and other stronger drought-resistant grasses are to be recommended in preference.

Where other Pasture Grasses, such as Cocksfoot and Ryegrass, can be successfully grown, there is not the need for *Paspalum*, although it is valuable for supplying pasture during the three or four Summer months, when Cocksfoot and Ryegrass are dormant.

CLIMATIC CONDITIONS.—Although it appears to be a plant only suitable for very warm climates, still actual experience shows that *Paspalum Dilatatum* can be grown in many parts of Australia, providing the soil conditions are suitable. In colder localities, however, the season of growth will be much shorter, but, once established, except under very severe Winter conditions, *Paspalum* will hold in the ground and start away again with the first evidence of warm Spring weather. *Paspalum* is largely grown throughout Queensland and the Northern Rivers district of New South Wales, as well as in many parts of Victoria.

SOILS.—*Paspalum Dilatatum* delights in a deep, rich soil, and moisture is essential to success. It will grow splendidly in damp localities, and on swampy or marshy land liable to dry up and crack in the Summer, as owing to its deep rooting habit, the roots penetrate well down into the ground, and are thus able to withstand a fairly long drought, as well as dry, hot Summers.

Where conditions permit, the plant well repays a properly prepared seed bed. Sometimes the seed is sown broadcast on the ashes after a burn, but providing the weather is warm at time of seeding, *Paspalum* will soon establish itself from seed with very little preparation of the ground.

METHOD AND TIME OF SEEDING.—The seed of *Paspalum Dilatatum* is very light and extremely difficult to distribute, and on this account it is hardly possible to sow through a drill. The general method is to broadcast, mixing the seed with dry sand to ensure even distribution, and sowing at the rate of from 6 to 8 lbs. of Brunning's heavy, hand-shaken, "STANDARD" grade seed per acre. Of lower grade seed, a larger quantity per acre will be necessary.

Seeding can be carried out from the first rains in March, up to the end of April, and again from the end of August to the middle of October. Late Autumn sowing is, however, inadvisable, as if the soil is cold, the seed is liable to hang in the ground, and may possibly rot; Spring seeding generally gives the best results, as the ground, being warm, germination is speedy, and the plants soon grow and establish themselves.

SUBSEQUENT TREATMENT.—When the plants are from 10 to 12 inches high, stock can be turned in for a few days at the rate of 3 or 4 beasts to the acre, and this will help to keep down the weeds until the *Paspalum* gets a good start. Do not allow the stock to remain too long on the pasture, otherwise the young plants are liable to be eaten down before thoroughly establishing themselves. The paddock can then be given a rest, and in a few weeks will be growing strongly, by which time the roots will have thoroughly established themselves, when the pasture can be kept grazed continuously.

Owing to the excessive root development, which mats to such an extent that it will choke the plants, it is quite possible that after several years the pasture will go off, and will not respond satisfactorily to a top dressing with fertiliser. At this stage, it will require renewing, and the best method

FODDER CROPS FOR AUSTRALIA

PASPALUM DILATATUM. (Continued.)

is to plough and sow the ground down in Perennial Ryegrass, Cocksfoot and Mixed Clovers.

This mixture will give good results for a certain period, and until the Paspalum again takes possession, or the old Paspalum may be broken up by double disk ploughing twice, three inches deep the first time, and deeper the second, following this by harrowing and cross harrowing. By this means, the roots are sufficiently broken to rejuvenate the pasture, after which a top dressing with Superphosphate, and a re-sowing of Clover seed can be made.

PASTURING PASPALUM.—Paspalum pastures give the best results when they can be stocked heavily to prevent rank growth. Close pasturing also allows for a better development of the plant, and a greater stooling of the White Clover or the "TARWEI" Strawberry Clover, where sown in mixture, especially as no good purpose will be served by allowing these particular Clovers to seed, both being readily propagated by the creeping roots. It is, therefore, advisable to pasture Paspalum Dilatum just as long as the growth allows such treatment. In the Northern Rivers district of New South Wales, the highest milk yields are secured by those farmers who keep their Paspalum pastured like a turf.

PASPALUM FOR HAY.—In a moist season, it often happens that Paspalum plants will grow quicker than the stock can keep them eaten down, and in this case the excess growth can be well utilised for hay. The best time to cut for Paspalum hay is just before the flowers appear, and by this means the woody, fibrous nature of mature Paspalum hay is eliminated. Hay can be readily cured, and when Paspalum is grown in mixtures with either White Clover or "TARWEI" Strawberry Clover, the result is a mixed hay of excellent quality very palatable to stock.

"SATISFIED ONLY WITH BRUNNING'S SEEDS."

"Koo-man-goo-nong,"

Pakenham East.

1/9/21.

Messrs. F. H. Brunning Pty. Ltd.,
Melbourne.

I have been obliged sometimes in a hurry to use other seeds than yours, and once or twice I was induced to give some other orders for grain.

I have only been really satisfied when I have had your seeds; that is my experience so far.

(Signed) W. BRUCE RONALD.

PASPALUM IN MIXTURES.—Paspalum is often sown in mixtures for permanent pasture with Ryegrass, Cocksfoot and Clovers, and when included in such mixtures is usually sown at the rate of about 2 lbs. of good seed per acre.

Another first-class mixture is White Clover and Paspalum, either sown together or the former about two months after the Paspalum has been seeded, using from 6 to 7 lbs. of Paspalum Dilatum and 2 lbs. of White Clover seed per acre. (See also Strawberry Clover, page 67).

QUALITY OF SEED.—Paspalum seed is produced very abundantly, but ripens unevenly, and shatters easily, and for this reason it will be easily realized that **HAND STRIPPED OR HAND SHAKEN SEED** is much preferable to seed harvested by machinery, as the latter is often bruised and invariably contains a large proportion of immature and unripe seed. Apart from the test of quality afforded by an inspection of the seed under a Magnifying Glass, good quality seed of Paspalum Dilatum should weigh from 135 to 140 lbs. per standard corn sack, and it is advisable to make enquiries on this point when purchasing seed. Only the best hand-shaken seed will comply with this condition.

The germination of Paspalum Dilatum seed depends very much on the period of growth prior to harvesting, as while in a short Summer the plants will form seed of good appearance, the absence of warm weather militates against the seed filling properly, and generally the body or kernel whence the growth is made, is wholly or partially lacking.

In order to improve the percentage of germination by removing as far as possible immature and unripe seed, Messrs. F. H. Brunning Pty. Ltd., machine-dress all their Paspalum Dilatum seed before sale. Owing to the nature of the seed a very complete equipment is necessary to make this operation a thorough and complete success.

PROPER SOIL CULTIVATION IS ESSENTIAL TO SUCCESS

RHODES GRASS

(*Chloris gayana* or *virgata*.)

Rhodes Grass is a perennial grass originally introduced from South Africa. Although of perennial habit, it is generally treated as an annual in Victoria, as it rarely survives the Winter, the first severe frosts usually killing the plants right out. It develops numerous running stems, which root at every joint, and after covering the ground with herbage, the shoots assume an upright position, finally attaining a height of 4 to 5 ft. It yields an immense quantity of nutritious and palatable herbage, readily eaten by all stock, and is well worth planting on every dairy farm where conditions are suitable for its growth.

Rhodes Grass is unsuitable for growing in mixtures with dwarfer grasses, having a tendency to smother them, and the best returns will be secured by sowing it alone, especially as the plants require plenty of room for development.

During the warm weather the plants grow readily and continue to spread until cut down by frosts in the Winter, and although the plants seed freely and spread quickly by runners, Rhodes Grass is easily controlled (quite apart from being killed by frosts) and seldom becomes a troublesome weed.

SOIL REQUIREMENTS AND PREPARATION.—Although it will survive and make growth during a lengthy period of drought, Rhodes Grass does best on a fairly moist soil. Deep, rich loam ground is the best suited to its growth, but it also grows well on land too alkaline for Lucerne, Ambercane, Millet, etc.; for this reason it is valuable for growing under irrigation where the irrigation water is somewhat alkaline. Dry, sandy soil, or dry, hard clayey ground is unsuitable, and only poor returns may be expected on this class of land.

A fine, firm seed bed is necessary to facilitate the easy penetration of the stem into the soil, and to assist in the fuller development of the plants. Plow the ground thoroughly in the early Spring, and harrow well until the surface is fine and even. Thorough soil preparation is extremely important, as even the best seed of Rhodes Grass is low in germination, and the young seedlings are always weak in growth until well rooted.

WHEN AND HOW TO SOW THE SEED.—As the young seedlings of Rhodes Grass are tender and easily injured by drought, sow as early as weather conditions permit. The seed must not be sown until all fear of frost is over, and under general conditions, about the beginning of October is the most suitable period, although sowing can be continued up to the end of November, and in very warm districts as late as the end of December.

Where climatic conditions permit, October sowing is to be recommended, as the soil moisture conditions are then more favorable to the germination of the seed, and to the growth of the young plants, although in humid districts, with regular tropical Summer rains, the later seeding should be quite satisfactory.

The seed is extremely light, and to ensure an even distribution, must be thoroughly mixed with sand. Sowing is generally done broadcast by hand, but sometimes a press drill is used. The drill answers very well when the seed is well-cleaned and free from chaff and stems, otherwise it is liable to clog. When sowing by hand, it is advisable to use only half the seed at the first sowing, and the remainder in going over the paddock at right angles to the direction in which the first sowing was made; by this method there will be very few misses and empty spaces. Owing to the lightness of the seed, it is necessary to choose a still, calm day for sowing, otherwise the breeze is liable to cause uneven distribution.

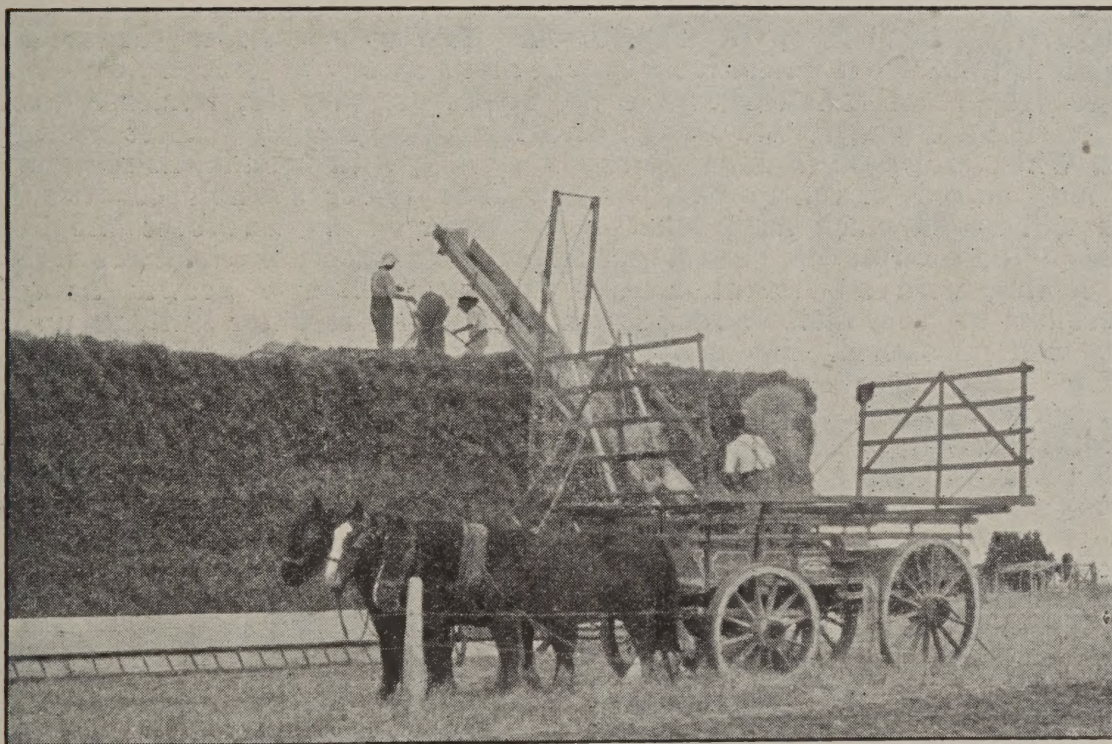
The amount of seed per acre varies according to the quality and the state of the ground, and the figures given here are for Brunning's Super-Grade, re-cleaned Rhodes Grass seed, sown on land in good condition. When hand-seeding, from 8 to 10 lbs. of best-quality seed will be required, but where a press drill is used on well-prepared soil, from 4 to 5 lbs. per acre will prove sufficient.

FODDER CROPS FOR AUSTRALIA

RHODES GRASS. (Continued.)

Rhodes Grass seed is of very low viability, and a germination of 40% may be considered quite satisfactory, although in some seasons, samples of Rhodes Grass have germinated as high as 70%, but this is very exceptional.

After sowing, cover the seed very lightly, and then roll the ground to compact the surface, thus conserving all the moisture possible. Should the ground be dry at time of sowing, irrigate immediately. The seeds germinate rather slowly, and if there should be no rain shortly after the first irrigation, a second watering must be given before the soil becomes very dry, as one of the chief essentials in securing a good stand of Rhodes Grass is to maintain a fair supply of moisture in the soil until the plants have developed a strong growth. Sometimes, during dry weather, where irrigation is not available, the seeds may remain in the ground for some weeks and still retain their vitality, but once there is sufficient moisture it causes sprouting. It is necessary to maintain this moisture supply for several weeks, or the young plants will die off. When the plants are about 7 or 8 weeks old they will then be well established and constant moisture supply is not so essential.



A Convenient Method of Stacking Hay.

SUBSEQUENT TREATMENT.—The very nature of Rhodes Grass seed precludes the possibility of sowing in well-defined rows, and cultivation is very seldom feasible. Rhodes Grass requires no special attention until ready to pasture or cut, unless the ground is weedy, when a mowing is necessary as soon as the weeds reach about 12 inches in height, and a second mowing may be needed before the growth of the Rhodes Grass permanently checks the weeds. Once the ground is cleaned, there is little danger of the re-appearance of the weeds.

Where climatic conditions enable Rhodes Grass to be treated as a permanent pasture, a top-dressing with some nitrogenous fertilizer in the early Spring, followed by a disking, and in dry districts an irrigation, is extremely beneficial to the pasture. Rhodes Grass is thoroughly drought-resistant when established, and will live a long time without water, although it may make very little growth, but after moisture is applied it starts away rapidly, and will be ready for cutting in about 4 weeks after.

USE LIME FOR RESULTS. SEE PAGES 40, 41

RHODES GRASS. (Continued.)

AS A PASTURE PLANT.—Rhodes Grass was first cultivated as a pasture plant, and is still most generally grown for this purpose. Being greatly relished by sheep and cattle, recovering quickly after it is eaten down, and standing trampling well, its value in this direction will be fully appreciated. Where climatic conditions permit Rhodes Grass to stand through the Winter, it may be pastured through the entire year, though, of course, the quantity of feed during the cooler months is much less than during the warmer period of the year.

Continuous grazing is, however, not advisable, and it will be found more profitable to make one or two cuttings of hay, and to pasture during the rest of the year, as when grown for hay a certain quantity of seed is matured and falls to the ground, and runners are formed, which make new plants. During the grazing period, few stems or seeds are produced, and the plants benefit by the spell, making heavier growth during the succeeding months.

Where Rhodes Grass is alternatively pastured and cut for hay, it will generally be found better to make hay during the warm months of the year, and to graze during the cooler seasons. Even where grazing is the main object, it is always advisable to take one or two cuttings of hay in the season, and where hay is the principal object, it is a good policy to occasionally graze a few animals in the paddock.

RHODES GRASS FOR HAY.—The quality of Rhodes Grass hay is superior to that of hay made from most other grasses, insomuch as it contains a large proportion of leaves, while the stems are slender, tender and sweet, so that there is very little waste, and horses and cattle eat it with great relish. When grown on thin, sandy or clayey soil, with insufficient moisture, the yield may be only a ton or two per acre, but, under suitable conditions, the yields will be as much as 8 tons or more per acre. The best time to cut for hay is as soon as the seed begins to ripen, in very dry districts following each cutting with an irrigation so as to secure a new growth as quickly as possible, as very little new growth will be made after cutting until the soil is well moistened. From 3 to 6 cuttings can be made during the year, about 5 weeks being sufficient under favorable conditions, for the growth of the hay crop. Some growers have taken up to 9 cuttings in a single year, but this practice weakens the plants so much that yields are considerably smaller the following season, and it is generally better to make 3 to 5 cuttings in the Summer, making the last cutting about 3 or 4 weeks before frost is expected, as there is then much less danger of damage from this agency.

Lime is the fairy godmother to most soils. It makes heavy soil lighter and light soil more retentive. It is the "key" of Nature's store, for it sweetens the sourest and most infested of soils.

COUCH OR BERMUDA GRASS

(Cynodon Dactylon.)

In hot, dry districts, and particularly in New South Wales and Queensland, Couch Grass is very largely used for lawn purposes and, in fact, is one of the few grasses suitable for this purpose that will withstand extremely dry weather. As a fodder plant, it is valuable for warm, dry districts, and in addition, is especially suitable for binding sand hills, dams and embankments, owing to its long creeping shoots, which root at every joint.

Owing to its susceptibility to cold, seed of Couch Grass only germinates very poorly (if at all) when sown in the late Autumn or Winter, and the best time for planting in Southern Victoria is in the Spring, broadcasting at the rate of from 7 to 8 lbs. of Brunning's Re-cleaned M/D Seed. In Northern Victoria, N.S.W., and Queensland, seed may be sown either in the early Autumn or the Spring.




SPECIAL SEED MIXTURES. SEE PAGE 124

PHALARIS BULBOSA

(Toowoomba Canary Grass.)

Phalaris Bulbosa was originally introduced into this State under the name of Phalaris Commutata, or Toowoomba Canary Grass. Phalaris Bulbosa is a good plant, but the **TRUE Phalaris Commutata** is an inferior variety and one that for fodder value is very inferior to the Bulbosa.

Phalaris Bulbosa is thoroughly perennial, and makes a very useful permanent pasture on account of its cold-resistant qualities. It seems to thrive on cold weather, and the plants will grow an inch or more a day in the depth of Winter.

Phalaris Bulbosa is not a drought resister, and can only be relied on for fodder during the late Autumn, Winter and early Spring. Very dry weather is liable to kill out the plants, and it is therefore advantageous to sow in wide rows to permit of cultivation during the Summer.

Phalaris Bulbosa can either be grazed, cut for green feed or cut for hay, but its principal value is as a pasture plant.

The seed may be sown thickly in drills, but the best, surest and most economical method of establishing a pasture of Phalaris Bulbosa is to either procure the rooted plants or to raise the seedlings in a seed bed, transplanting out any time from May to August, from 24 to 30 inches apart. Transplanting out at these distances will permit of cultivation during dry weather, and thus preclude the possibility of an established stand of Phalaris suffering from lack of soil moisture during a dry Summer. The seed may be sown from March to June, and from 2 to 3 lbs. will raise sufficient seedlings to plant out an acre. The germinability of seed of Phalaris Bulbosa is not high, and 50% may be considered a very excellent growth. Care must be taken to procure seed free from Ergot.

PRAIRIE OR RESCUE GRASS

(Bromus Schraderi or unioloides.)

Prairie or Rescue Grass is one of the most nutritious of permanent pasture grasses, and does well in most soils, although the best results will be secured from somewhat moist or wet ground.

It is very hardy and thoroughly permanent, and providing the plants are not allowed to seed, will yield four or five cuttings in a year. While well suited for cool climatic conditions, Prairie Grass will give splendid results in the Northern areas of Victoria when grown under irrigation, and providing sufficient moisture is available, seems to flourish equally as well under the milder climatic conditions prevailing in those districts.

Its principal value is as a Winter fodder, and its palatability to stock is so pronounced that when included in mixtures, the other grasses are neglected until Prairie Grass has been eaten right out. It is, therefore, much better to plant Prairie Grass by itself, and seed may be sown in the Autumn or early Winter, broadcasted at the rate of from 30 to 40 lbs. per acre. The lower quantity applies to high-grade seed of good growth, such as Brunning's M/D, Graded and Tested quality.

Prairie Grass is a very useful plant, and may be pastured, cut for green feed, or cut and made into hay, which is of excellent quality. Care must be taken when grazing to see that the plants are not eaten right out, and the paddock must be spelled at frequent intervals to give the grass a chance of recovering itself. With careful treatment in this respect, and a top-dressing, every other Spring with Superphosphate, a field of Prairie Grass may be maintained in good order for many years.

Prairie Grass seed is also very liable to be affected with smut, and care must be taken to see that all seed purchased is free from this fungous disease.

WALLABY GRASS

(*Danthonia*.)

A Splendid Pasture Plant for Sheep Country.

Wallaby Grass, or to quote the botanical name, *Danthonia*, is found in many parts of Australia and New Zealand, and has been recognised for several years past as a valuable pasture plant thoroughly permanent on dry uplands, and extremely valuable for fattening stock. Where Rye Grass, Cocksfoot and the better Clovers will not grow, or where they are only permanent for a few years, Wallaby Grass makes a splendid pasture. It is especially suitable for cleared hill country and poor class ground.

VARIETIES.—There are numerous species of Wallaby Grass, but the best of the cultivated varieties are *Danthonia Pilosa* and *Danthonia Semi-Annularis*. They are both permanent in character, and being thoroughly hardy, will endure both hot and cold conditions, and are capable of standing a great deal of stocking. In habit, these two varieties are quite distinct, the *Semi-Annularis* having the longer leaves and growing more erect and tussocky, while *Danthonia Pilosa* is dwarfer, and forms a comparatively close sward.

It is necessary to keep *Pilosa* eaten well down, and with heavy stocking, this variety will form a quite level sward, and kept closely cropped, a considerable amount of fairly succulent herbage will be produced. *Semi-Annularis* is a native of Australia, while *Pilosa* is said to have originated in the North Island of New Zealand.

UTILIZATION.—*Danthonia Pilosa* is best suited for general purposes, and is by far the superior form, excepting for scrub or fern country, where burning off is necessary from time to time. In such a case, *Semi-Annularis* is recommended, as its taller and drier growth will carry a fire so much better. Second and third-class country, originally sown with Rye Grass, Cocksfoot, etc., will in time, become almost pure *Danthonia* pasture, and as the best class of this land will carry two sheep to the acre on *Danthonia*, it will be realised that this is a very valuable grass for poorer ground.

SOIL.—The use of Wallaby Grass is not advocated for permanent pasture on rich land, but only on land where Rye Grass, Cocksfoot and the better Clovers will not succeed. *Danthonia* is never seeded on ploughed land, except under special conditions, such as pumice country, but is always sown on the ashes of third-class forest land, or on burnt scrub or fern country.

QUALITY OF SEED.—Owing to the fluffiness of the seed, machine-dressing is out of the question, and samples often contain large amounts of Hair Grass, Yorkshire Fog Grass, and Rye Grass. These impurities, however, are not serious, as their presence on the type of land on which Wallaby Grass should be sown, cannot be looked upon as harmful.

SOWING THE SEED.—The quantity of seed varies according to conditions, and sown by itself, from 15 to 20 lbs. is broadcasted per acre. The best and most satisfactory method of establishing Wallaby Grass, especially on country where the better Grasses and Clovers will stand for a few years, is to sow in a mixture, in which case from 3 to 5 lbs. of seed would be required per acre.

Where cost precludes the use of Rye Grass, Cocksfoot, etc., Yorkshire Fog and Wallaby Grass make a good mixture, using 20 lbs. of the former and from 4 to 5 lbs. of Wallaby Grass, per acre.

The latter quantity can be increased with advantage.

Wallaby Grass is fairly slow in developing, hence the advisability of using other grasses to cover the land rapidly, but when once established it spreads quickly, owing to its habit of seeding, even when fairly heavily stocked. Seed may be sown from the first Autumn rains in March, up to the end of June.

Sowing is always done broadcast by hand, and the seed is very difficult to scatter evenly, owing to the seeds matting together. The only method possible is to mix the *Danthonia* thoroughly with some clean, dry, silver sand, in order to separate it as much as possible, but in windy weather, it

WALLABY GRASS. (Continued.)

is almost impossible to make an even distribution of the seed, therefore, it is advisable to choose a still day for sowing. The germination of Wallaby Grass seed may reach 80%, but it is very variable, and an average germination of 50% can be considered very satisfactory.

GENERAL TREATMENT.—The necessity of sowing in mixture is that Wallaby Grass gives practically no feed the first season, but when established, grows rapidly, and must be kept heavily stocked, otherwise the plants become woody. Wallaby Grass stands frosts well, and *Danthonia Pilosa* will make good growth during the Winter and yield very palatable feed. For this further reason, it is generally regarded as superior to *Semi-Annularis*, and its average carrying capacity may be taken as fairly high.

TOP DRESSING OF PERMANENT PASTURES

(By increasing the stock-carrying capacity, improves the value of the land.)

In spite of the overwhelming evidence in favor of top-dressing Permanent Pastures, landowners are still slow to realise the advantages of this operation. If a machine were used year in and year out without being oiled or having the bearings replaced, it would wear out and become useless in a very short period, and applying the same argument to Permanent Pastures, they will, unless "oiled and the bearings renewed," by cultivation and top-dressing with fertilizer, wear out and deteriorate in a similar manner.

Good pastures have just as much to do with the quality of live stock as careful methods of breeding, and if the value is made greater by improving the character and increasing the bulk of feed, the carrying capacity of the land, and this is what determines its value, is considerably enhanced.

The chief deficiency of almost all Grass and Clover land, and this includes Lucerne, is Phosphate of Lime, which requires to be applied in one of its several forms according to the quality of the prevailing herbage and the nature of the soil. The best grasses are rich in Lime, and this constituent is equally as necessary to grasses as to clovers and other fodder plants, and should there be any doubt about a sufficient supply of this important element being in the soil, a dressing must be given. The reader is here referred to pages 40 and 41 for fuller information.

Returning to the subject of top-dressing, it has now been proved that liberal applications of Superphosphate or Basic Phosphate invariably have such a striking effect on the pasture, that there is no doubt that the need of most grasses in respect to Nitrogen is amply covered by the supply drawn from the atmosphere through the abundant growth of the clovers induced by these applications of the Phosphate. As the young clover plants (and clover is, or should be, included in every Permanent Pasture) possess the power of assimilating atmospheric nitrogen only to a very limited degree until they reach a certain stage of development, it is therefore necessary that prior to arriving at this stage, the plants avail themselves of the nitrogen in the soil. Unless farm yard manure, high-class guano, sulphate of ammonia, nitrate of soda, or some other good form of nitrogenous fertiliser is used, the pasture in the early stages of growth is liable to suffer for lack of nitrogen. It is not possible to give any standard rate of application, and every farmer must use his own judgment. The only sure guide is to make a practical test, and by treating a small patch in a paddock in several different ways, conclusive results can be obtained. The reports regarding the success of top-dressing appearing throughout this work will be ample testimony to the value of this operation.

Space does not permit a very lengthy article on this subject, but the following experiences will be valuable, and will prove conclusively that wherever the rainfall exceeds 20 inches per annum, or where Permanent Pastures of Grasses and Clovers are being laid down and moisture applied by means of irrigation, top-dressing will give a handsome return not only in the increased bulk and quality of the feed, but in the improvement in the

TOP-DRESSING OF PASTURES. (Continued.)

health of the animals, as well as of the human beings dependent for food upon these animals. There is no doubt that if top-dressing became a general practice, many more animals than at present could be easily maintained on the same area, thus increasing the stock-carrying capacity of the land, and incidentally its value.

Mr. J. S. Edge, of Allansford, in an article appearing in the "Warrnambool Standard," stated:—

"So impressed was I with the good results I saw in this district from the practice of top-dressing that last Autumn I used several tons of Super., and the response was so satisfactory that I am continuing the process this season."

Mr. F. D. Lowe, of "Strathalbyn," Scott's Creek, writes:—

"I have no hesitation in saying that top-dressing with Super. is the best asset that the Man on the Land has. I have repeatedly noticed that stock cross over untreated pasture to where the Super. has been put on."



Mr. A. J. Simpson, Clifton, Hamilton, writing to another journal, remarks:—

"My experience of top-dressing grass land extends over a period of seven or eight years, and I am more convinced each year that it is a payable proposition, and that after top-dressing natural pasture for a few years, the carrying capacity is greatly improved and its fattening qualities enhanced, while the stock grazed on it bear marked evidence that they are getting something essential which before was wanting."

Mr. L. G. Marrabel, of Warragul, remarks:—

"I can safely say that I have topped off just double as many cattle as in any other year, and that they came off looking very much healthier."

Space does not permit the publication of further experiences, but the reports already given from such successful practical men will surely be sufficient testimony to the value of this process, and the reader has only to read the agricultural sections of the "Australasian," the "Leader," and the "Weekly Times," for further evidence and confirmation of the benefits to be derived from this practice of **"TOP-DRESSING PASTURES."**

ENGLISH PASTURE GRASSES

The permanent pasture plants usually included under the heading of "English Grasses," most generally used in this State, include Perennial Rye Grass (together with its biennial types of Italian and Westernwolph's), the Fescues, the Poas, Sweet Vernal, Timothy, Cocksfoot or Orchard Grass, Creeping Bent or Fiorin, Crested Dogtail, Meadow Foxtail, Yorkshire Fog Grass and Rib Grass.

Of these, the most important in this State, from an agricultural point of view, are the Rye Grasses and Cocksfoot. Wimmera Rye Grass (*Lolium Subulatum*) can hardly be termed an English grass, but it is included in this section for the sake of convenience.

RYEGRASS

(*Lolium perenne*.)

PERENNIAL RYE GRASS, as the leading constituent of most permanent pasture and lawn grass mixtures for this State, is too well known to need any lengthy description. Perennial Rye Grass is sometimes known as English Grass, English Rye Grass, Irish Rye Grass, Victorian Rye Grass, Western District Rye Grass, or New Zealand Rye Grass, but these names are merely an indication of the country of origin of the seed, and the plant is the same (*Lolium perenne*) in all cases.

Lolium Perenne is not truly permanent on all soils, nor under adverse conditions, but when seed of the true Perennial Rye Grass is sown on suitable soil, and the requirements of the plant are met, it will prove to be perpetual.

Perennial Rye Grass has a very wide sphere of utility, being suitable for both pasturing and cutting for green feed, while it makes hay of very high feeding value. It deteriorates very little by being allowed to reach maturity and arriving quickly at this stage, is worth including in every permanent pasture mixture for this reason alone. It gives the best results on a rich, moist soil, and responds very readily to both irrigation and top-dressing, and is particularly valuable for including in Permanent Pasture Mixtures in irrigation areas.

The quality of Rye Grass seed, as far as foreign matter and weed seeds are concerned is generally very high, but varies considerably in other ways, and can only be actually arrived at, by ascertaining the weight per imperial bushel measurement of the seed. This may vary from 23 to 39 or 40 lbs., although the latter is exceptional, and any seed which goes 27 lbs. and over per imperial bushel may be regarded as fairly satisfactory. The difference in the bushel weight is due to the greater plumpness of the kernel, which is the weighty part of the seed and the shorter glume, and the heavier the imperial bushel weight of clean, unloaded seed, the plumper and more mature the kernel and the lesser glume or "fluff."

The difference between, say 27 lb. and 34 lb. Rye Grass in this respect is very considerable, and as the shorter seed is more truly perennial, this will be a guide to the reader in making his selection. Rye Grass seed is not sold on the basis of imperial bushel measurement, this figure being merely quoted as a guide to the quality. All Grass seed, when quoted per bushel, is estimated on the basis of 20 lbs. per bushel weight, irrespective of the imperial bushel measurement. (See page 68 for analysis).

ITALIAN RYE GRASS AND WESTERNWOLTH'S RYE GRASS (*Lolium italicum* and *Lolium Westernwolthicum*) are biennial forms of the Perennial Rye Grass, useful for early Spring feed, and are often included in Permanent Pasture and other mixtures to secure a quick pasture before the more permanent grasses are thoroughly established. Westernwolph's is a re-selected form of the Italian, which comes in slightly earlier and yields a greater abundance of fodder.

All Rye Grass seed sown alone is broadcasted at the rate of 2 bushels (40 lbs.) of seed per acre. Rye Grass is, however, generally seeded in mixtures, and the quantity used varies according to the conditions.

LOLIUM SUBULATUM OR WIMMERA RYEGRASS

This plant is a drought-resistant form of Italian Rye Grass, which grows well in the Wimmera, Mallee and Northern wheat-growing areas of Victoria. It has been derived from a grass which is a native of Southern Europe.

Lolium Subulatum is an annual and the seed is somewhat similar in appearance to that of Italian Rye Grass, although minus the awns, so prominent in the latter, and on this account it very much resembles the seed of *Lolium Temulentum* (Drake).

The use of Wimmera Rye Grass is not advocated for sowing down on high-priced black wheat land, worth say from £12 to £18 per acre, and its real use is on the lower valued types of red land, and the classes of country in the Wimmera that are unproductive to Wheat.

The period of growth is the same as that of the cereals, the seed deposited in the ground from the previous season starting away with the first Autumn rains, and in an average year providing green pasture from April to December, while dry feed is available during the remainder of the Summer and well into the Autumn. The growth of *Lolium Subulatum* in the Spring is remarkably vigorous, and the plants flower about the middle of October.

POINTS OF INTEREST ABOUT LOLIUM SUBULATUM.

1. Will double the carrying capacity of the present Wimmera and Mallee pastures.
2. Once sown, does not require re-seeding, even though the land is broken up for cereal crops. An occasional scarifying will maintain it at full productivity.
3. It can be easily stripped for seed.
4. It retains its seed well attached to the dry straw, hence the dry feed is nutritious.
5. It makes first-class ensilage.
6. It will furnish, if required, self-sown hay of excellent quality, equal in quantity to a stubble-sown crop of oats.
7. It is better cut with a mower rather than with a binder.

Seed may be sown by itself, in which case from 15 to 20 lbs. per acre is sufficient, or it may be sown with a cereal crop on land which it is proposed to rest. In this case, a light seeding must be made or the cereal crop may be interfered with, and under these conditions about 2 lbs. of seed per acre will be found sufficient. The best time for sowing the seed is from March to June.

As a pasture grass, Wimmera Rye Grass has already fully demonstrated its high value, and providing it can be controlled and does not become a pest to the wheat grower, it is going to revolutionise the productivity of many areas of land in the Wimmera and Mallee, where irrigation facilities are not available. There is no doubt about its value as a pasture plant, and it is to be hoped that Wimmera Rye Grass will prove easily controllable, but for the present it should not be sown on the rich, black wheat land until this controllability has been more thoroughly demonstrated.

As previously stated, Wimmera Rye Grass is an annual, but it owes its permanent habit to its power of re-seeding itself and to the wild-oat-like persistency with which it annually grows from seed.

COCKSFOOT OR ORCHARD GRASS

(*Dactylis glomerata*.)

Cocksfoot is too well known to need any lengthy description, and in many parts of Europe is considered to be the best of the four most valuable upper grasses for permanent pasture, which are Meadow Foxtail, Meadow Fescue, Tall Oat Grass and Cocksfoot.

It is particularly adaptable to both soil and climate conditions, and will do well on light, sandy or heavy clay lands, in moist or dry ground, and has already been proved not only for Gippsland and the Western District of Victoria, but for the Northern areas of this State, where it gives exceptionally good results, grown under irrigation, in a permanent Pasture mixture of grasses and clovers.

Seed is sown in the Autumn or early Winter, and while the growth is slow during the first season, the plants will be seen in full profusion the second year. Providing a top-dressing is given every two or three years (see page 111), a Cocksfoot pasture, once properly established, may be maintained in good condition for 30 or 40 years.

The remarks regarding the imperial bushel measurement of Rye Grass on page 113, apply equally to Cocksfoot, and readers are advised at all times to purchase seed weighing at least 16/17 lbs. to the imperial bushel. Commercially, Cocksfoot is generally sold by the pound, and very seldom by the bushel, but when purchased in this way, 20 lbs. weight of seed is reckoned to the bushel, irrespective of the imperial bushel measurement.

Sown alone, 40 lbs. of seed will be required per acre, but the best results will be obtained by sowing in permanent pasture mixtures, when the quantity may vary from 4 to 10 lbs. per acre, according to conditions.

OTHER ENGLISH PASTURE GRASSES

The principal other English Pasture Grasses apart from possibly Crested Dogstail, Creeping Bent and Kentucky Blue Grass do not play a very important part in Australian agriculture, being chiefly utilized in this country for lawn purposes. Exceptions to the latter are Meadow Fescue, Tall Fescue, Poa Aquatica, Rib Grass and Yorkshire Fog Grass, which are unsuitable for Lawns.

CREEPING BENT OR FIORIN (*Agrostis stolonifera*) is a good feeding grass with abundant fine-leaved foliage, palatable to all kinds of stock, and is suitable both for grazing and for hay-making.

It prefers a moist damp soil, but when once established on this class of land, will stand fairly long periods of dry weather. Sown alone, about 20 lbs. of seed is required per acre, but the best results will always be obtained by including this grass in permanent pasture mixtures with other grasses and clovers. (See also "Tarwei" Strawberry Clover, page 69.)

Creeping Bent is a valuable grass for including in Lawn Mixtures, as well as for Croquet Greens and Golf Links on account of its fine texture, attractive deep green color, and stoloniferous roots which form a fine close turf.

MEADOW FOXTAIL (*Alopecurus pratensis*) is a very useful grass for perennial pastures, and one which should do splendidly under irrigation. It is rapid in growth, starting off early in the Spring, and producing a good quantity of feed when most of the other grasses are only just showing signs of growth.

Meadow Foxtail is palatable to all kinds of stock, and where soil conditions suit, a small proportion should be included in all permanent pasture mixtures. Where top-dressing is carried out regularly, Meadow Foxtail will give good results on all classes of soil, and can either be pastured or cut for hay.

Sown alone, from 12 to 15 lbs. of seed is required per acre, but the best results from this very useful plant will be obtained from growing it in mixture with other grasses and clovers.

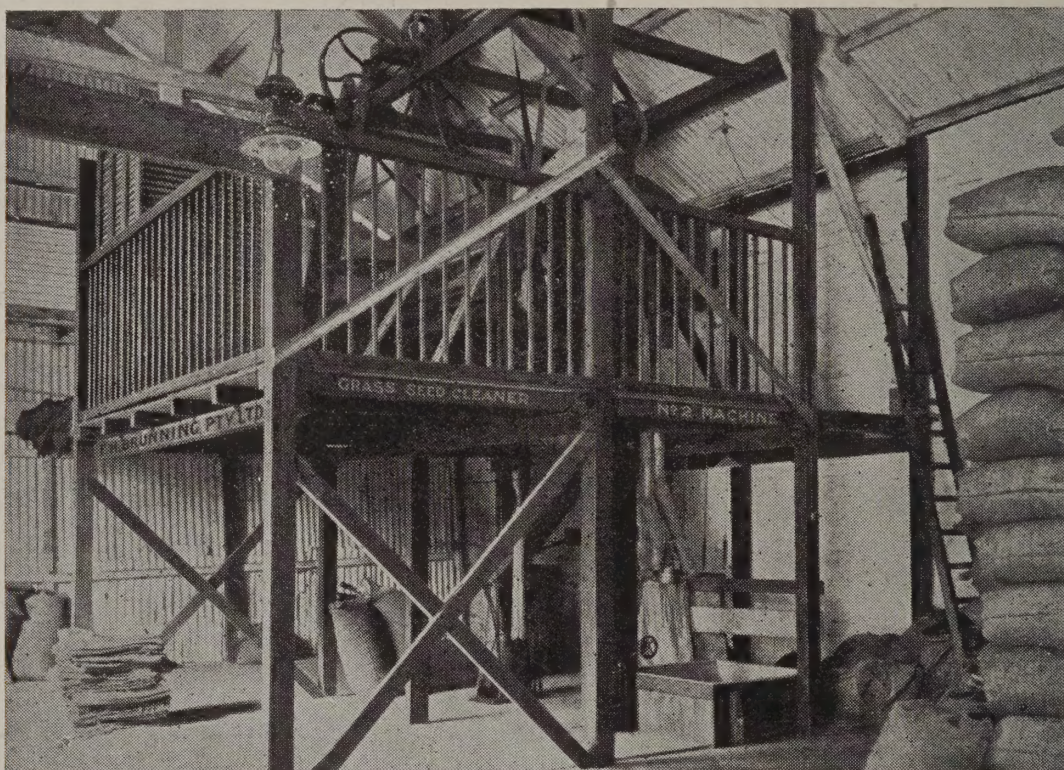
CHEWINGS FESCUE, HARD FESCUE, SHEEP'S FESCUE AND RED FESCUE are very similar in habit, appearance and adaptability. All four are sown broadcast at the rate of 40 lbs. of seed to the acre. Chewings Fescue is really the best of all these varieties, and is excellent for light, stony soils.

OTHER ENGLISH PASTURE GRASSES. (Continued.)

It has good feeding value, and being hardy will make fair growth through the Winter, while it is valuable on account of its hardiness to dry weather.

The principal value of these four Fescues in Australia is for Lawns, Golf Links, Tennis, Bowling and Croquet Greens. Sheep's Fescue is especially valuable in shady places and in sandy soil while Red Fescue is very hardy and robust, maintaining itself by means of its creeping roots, which enable the plant to remain green when other grasses have dried up. All four varieties are better adapted for pasture than for hay.

TALL FESCUE is suitable to damp and marshy situations and under such conditions is very productive and strong growing. The plant can either be pastured or cut and cured into hay. Sown alone, it is seeded at the rate of 30 lbs. of seed per acre. Seed of Tall Fescue is usually of low germination, and a growth of 50% may be considered very satisfactory.



Special Grass Cleaning Machine. A portion of Brunning's Complete and Up-to-date Seed Cleaning Plant at South Melbourne.

MEADOW FESCUE (*Festuca pratensis*) also known as Evergreen Grass, Sweet Grass and English Blue Grass, is a good plant for Permanent Pasture Mixtures. It yields a large quantity of nutritious herbage of first-class fattening quality, and very palatable to stock; when cut and cured it makes excellent hay.

Meadow Fescue is best adapted for moist and slightly heavy ground, and when sown alone is seeded broadcast at the rate of 40 lbs. of seed per acre. It is, however, better adapted to mixtures, being somewhat slower in development than other grasses taking about three years to attain full maturity, and Perennial Ryegrass will generally be found better suited to Australian conditions.

POA AQUATICA (Water Meadow Grass) is useful for marshy land and swamps. The plant is somewhat coarse in growth, but has a fair nutritive value, and grows luxuriantly on moist ground, yielding 3 or 4 cuttings a year. The seed of *Poa Aquatica* is generally of low germination, and has not been available for several years past.

When seeded alone, about 25 lbs. of seed is broadcasted per acre.

As a general rule *Paspalum Dilatatum*, Creeping Bent, "TARWEI" Strawberry Clover or Lotus Major will be found equally or more satisfactory than *Poa Aquatica*, according to the soil and moisture conditions. See page 68 for comparative feed values).

FODDER CROPS FOR AUSTRALIA

OTHER ENGLISH PASTURE GRASSES. (Continued.)

POA PRATENSIS (Kentucky Blue Grass) is a valuable pasture grass, and is also very much used in lawns, while in many parts of the United States, it is the staple Permanent Pasture Grass. It does not appear to thrive well on heavy moist soils, but gives good results on fair quality ground and light warm soils, and being drought-resistant will withstand fairly dry Summers.

The plant is also very hardy as regards yield. Being of creeping habit and possessing a dense spreading root, once established it is very permanent, and on this account is especially valuable for including in mixtures under fairly dry Summer conditions.

The seed is very seldom sown alone for pasture, and in such a case 30 lbs. would be required to broadcast an acre. The best results in this country appear to be obtained from sowing Kentucky Blue Grass in mixtures with other Permanent Pasture Grasses and Clovers.

SWEET SCENTED VERNAL (*Anthoxanthum odoratum*) is worth including in every Permanent Pasture Mixture on account of its delicious perfume, which adds very much to the fragrance of hay. The grass is valuable both for pasture and for hay, and a small proportion included in mixtures adds very much to the fragrance of the latter. The plant is very palatable to stock and pastures in which this grass abounds produce good flavored meat.

Sown alone about 20 lbs. of seed would be required per acre, but the best results will be obtained from including $\frac{1}{2}$ to 1 lb. in mixtures with other Grasses and Clovers. Sweet Scented Vernal is hardy and permanent when once established, and appears to come into growth much quicker than many of the other permanent grasses. There are two types, the Annual and the Perennial, but these remarks apply to *Anthoxanthum odoratum*, the true perennial variety.

CRESTED DOGSTAIL (*Cynosurus cristatus*) is a most useful evergreen grass for permanent pastures, not so much on account of its great productivity, but because of its exceptionally high nutritive value. It is a tuft-forming grass, growing from 20 to 24 inches high, and prefers a heavy moist soil. It is useful for hilly situations, as the roots penetrate deeply into the soil and the plants therefore withstand dry weather very well.

It is also a valuable grass for Lawns, its deep green narrow leaves and its dwarf growth rendering it most useful for this purpose.

Sown alone, about 20 lbs. of seed is required per acre, but the best results will be obtained in this State from including from 2 to 6 lbs. per acre in mixture with other grasses and clovers, the quantity varying according to conditions.

YORKSHIRE FOG GRASS (*Holcus lanatus*) is a big tuft-forming grass growing from 24 to 30 inches high, with rather broad and abundant foliage. Although it yields a very large bulk of feed, there is very little weight in it, and it is of little value either for grazing or for hay as it is not very palatable to stock. This is probably because it is of very little nutritive value, and on account of the stalk and blades being rather hairy. Stock will only eat it where other more nutritive and palatable grasses are not available, but where better feed is in the paddock, the Yorkshire Fog Grass will be seen, left quite untouched.

The plant is generally looked upon as a weed, and it is only worth growing on poor quality land where the better class grasses and clovers cannot be established. A certain proportion of Yorkshire Fog Grass is very often present in samples of Cocksfoot, this no doubt being due to the fact that conditions suitable for the more valuable grass appear to suit the latter.

When it is desired to sow Yorkshire Fog Grass by itself, 20 lbs. of seed will be needed to sow an acre. The best use for this plant is for sowing in mixtures with a grass such as Wallaby Grass, to secure a quick pasture while the slower developing plant is establishing itself. Yorkshire Fog Grass is also known as Woolly Soft Grass, Velvet Grass and Mesquite Grass.

OTHER ENGLISH PASTURE GRASSES. (Continued.)

RIB GRASS (*Plantago lanceolata*) is a perennial grass which generally speaking, may be regarded as a weed, and its use on good or second-class land is not recommended. The plant is of very low nutritive value, and can only be grazed as owing to the dwarf foliage it is not possible to cut for hay.

Seed is generally sown in mixture with other grasses at the rate of 2 lbs. per acre.

Rib Grass is often present as a weed in samples of Ryegrass, Cow Grass, and Red Clover.

TIMOTHY OR CATTAIL (*Phleum pratense*) is very little grown in Australia, but in America and Europe it is one of the most universally known and cultivated grasses for Permanent Pasture. It is a splendid grass for cold moist soils, while it has been proved to give splendid results when grown in warm districts under irrigation in mixture with Alsike Clover. The plant grows in even tufts, and produces a fair quantity of both stalks and foliage of average nutritive value.



A closer view of the illustration on p. 122, showing the clovers in bloom.

Timothy cannot be recommended as fodder in its green state, as it tends to go hard even when cut before flowering, and for this reason should not be included in Permanent Pasture Grass Mixtures. It is most suitable for growing in mixture with Clovers, as Timothy, being a rather late variety, will still be young and tender when the first cutting of the Clovers is being made, and it does not grow quick enough to become hard and woody when the second cutting is being taken.

Seed is sown in the Autumn, and when seeded alone 30 lbs. will be required per acre. In this country Timothy is usually sown in mixture, and grown as recommended above with Clovers, will be very valuable and palatable as hay.

PERMANENT GRASS AND CLOVER PASTURES FOR THE NORTHERN AREAS OF VICTORIA

(Bunning's Special System of Laying-down and Methods of General Treatment.)

The value of land in Northern Victoria with irrigation facilities, has generally been regarded as much too high to permit the laying down of any part thereof under grasses and clovers for pasture purposes, quite apart from the fact that it has previously been understood that these grass and clover permanent pasture mixtures were only suitable for the Southern parts of the State, such as Gippsland and the Western District.

VALUE AND UTILITY.—The practice of intense cultivation on limited areas of high-priced land, necessitates getting the best as well as the most off it. On every irrigation holding, without exception, there necessarily exists a smaller or larger area on which the owner has to pay for water rights, but which produces nothing but natural grasses, and then only for a brief period of the year. Be this area one acre or twenty acres, there is the opportunity to test out the merits of acclimatised grasses and clovers sown in mixture, without trespassing upon the other activities of intense culture, and if the experiment be put to the test, it will increase the production to ten or more blades of grass where only one grew previously.

The aim of every successful agriculturist is to increase production, and if the laying down of a permanent pasture mixture of grasses and clovers will ensure the yielding of ten or more blades of grass, where only one grew previously, is it not a sound business proposition? In the Stanhope, Rochester and Bendigo irrigation districts, approved grass and clover pastures have been thoroughly and exhaustively tested during the past 8 years, and their value definitely proved, while their capability to carry stock all the year round has been clearly demonstrated.

Mr. A. Glass, of Messrs. Glass Bros., Nanneella, stated (1/6/21):—

"We have had some of our permanent pasture established for over eight years, and it is better now than ever it was. The inclusion of Subterranean Clover is valuable as once established it is always there, and comes away when the other grasses and clovers are dormant."

Mr. Henry Harry, Hallam Street, Bendigo, writes regarding his property at Dingee (16/5/21):—

"My permanent pasture is doing wonderfully well on red plain land and carries heavily. It should take possession of the North by replacing Barley grass. I am quite satisfied with my pasture. I grazed heavily with sheep all last Summer, and now have a number of springing heifers on with good results."

Mr. Arthur Wallace, "Springdale Estate," Dingee, writes (28/5/21):—

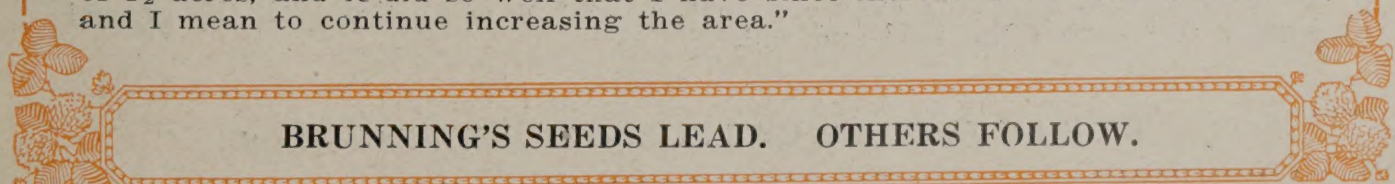
"This pasture mixture truly increases the carrying capacity of the land. The paddocks should be small and put off in rotation. Top-dress each year in the early Autumn with Super. During the first three months, I grazed the pastures lightly, then allowed them to grow and seed, then cut with a mower, and carried off for hay. Immediately the hay was off, I irrigated, and the growth then was wonderful of both the original grass and the growth from seed."

"I have successfully established a permanent pasture of grasses and clovers on my Springdale Estate at Dingee, and am thoroughly convinced that as a dairying proposition there is nothing better."

"I sowed 2 bushels of seed to the acre, leaving the mixture in your agent's hands, and am well pleased with the results."

Mr. T. S. Edge, Rochester, writes (18/5/21):—

"About eight years ago, your agent, Mr. Syd. Smith, advised me to try your grass mixture, which I did with great success. I first tried it on a small scale of 2½ acres, and it did so well that I have since increased the area to 30 acres, and I mean to continue increasing the area."



BRUNNING'S SEEDS LEAD. OTHERS FOLLOW.

PERMANENT PASTURES FOR IRRIGATION AREAS. (Continued.)

Mr. P. A. McAnulty, "Sevarpont," Stanhope, remarks (1/3/21):—

"The mixture you recommended for permanent pasture is a great success, and in spite of the fact that water was unobtainable in its early stage of growth, the paddock now resembles a bowling green, and it takes five head of stock all their time to keep it cropped close. I shall certainly have a good area under this mixture next Spring."

This gentleman wrote again (18/5/21):—

"With reference to the permanent pasture, I watered it for the last time five weeks ago and grazed it down."

"It is now making good growth and does not appear to be affected by the continued dry weather. It was the last week in September when it was sown down, and it was not until ten weeks later that I was able to obtain water, and I fully expected that it was going to be a failure for lack of moisture, so bad did it look in its first stage."

"I am quite satisfied with it, but would say that **the pasture did not get a fair trial** in my case owing to the late sowing, lack of water in its early stages, and the fact that I put it down on the poorest portion of my land."

There are now numerous proofs of this fact throughout Northern Victoria, and it has been established beyond doubt that where irrigation is available, a "Permanent Pasture Mixture," consisting of certain tested grasses and clovers, is suitable for Northern Victoria, in addition to, **BUT NOT IN PLACE OF LUCERNE**. It has also been proved that such a mixture will increase the stock-carrying capacity and usefulness of the Lucerne already established, as this can then be cut for hay and reserved for use as Winter feed, or sold when prices are high. An additional advantage is that when not required for grazing, a crop of hay of excellent quality may be taken.

SOIL REQUIREMENTS.—One special virtue of these permanent pasture mixtures as recommended herein is that shallow soil, and even gravelly country, where deep-rooting pastures such as LUCERNE could not thrive, may be advantageously utilized, while the capacity of the grasses and clovers to withstand surplus moisture permit their use in situations where LUCERNE and other plants would be drowned out.

HUBAM.

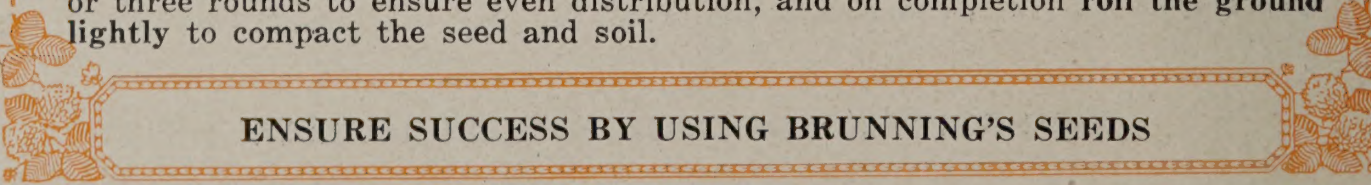
The reports appearing on the inside pages of the front and back covers of this book will be of considerable interest to many farmers who will find in Hubam, a plant of particular value especially for putting nitrogen and humus into land off which a Winter crop of grain has just been taken and for putting such ground into good order for sowing down the following Winter with another grain crop or for laying down under grass. The rapidity with which Hubam does its work is one of its special features.

Like Lucerne, all Clovers and Grasses require a certain proportion of Lime in the ground, and where the soil is deficient in this element, the land must be given a dressing prior to preparing the land for sowing.

SOIL PREPARATION.—To successfully establish the mixed grasses and clovers, plough the ground about 5 or 6 inches deep as early as possible in the Autumn, working the land down to a mellow tilth with a tine harrow, a double-disc harrow, a scarifier, and, if necessary, a roller. Proper soil preparation is essential, as if a fine, level, shallow seed bed is not provided, the small seeds are apt to be buried too deeply.

SOWING THE SEED.—A nurse crop is sometimes sown with the grasses and clovers in the Northern districts, but generally speaking, it is not the wisest method of procedure; where a nurse crop is employed. Algerian Oats or Skinless Barley are the two best suited for this purpose. The grain may be mixed with the grass and clover seeds, and all sown together, using about one bushel of either Algerian Oats or Skinless Barley per acre.

Experience has shown that the most successful results are attained through thorough soil preparation as previously recommended, so as to secure a fine, firm, level, shallow seed bed, for **deep seeding must be avoided**. Sow the mixture of grasses and clovers, whether alone or mixed with a nurse crop, through the grain run of a seed drill, making the rows 7 inches apart. During the process of sowing the seed, stir the mixture every two or three rounds to ensure even distribution, and on completion roll the ground lightly to compact the seed and soil.



ENSURE SUCCESS BY USING BRUNNING'S SEEDS

FODDER CROPS FOR AUSTRALIA

PERMANENT PASTURES FOR IRRIGATION AREAS. (Continued.)

The best time for sowing is from March to July, though in a favourable season, good stands have been established from seed sown as late as the middle of August. (See Mr. McAnulty's experiences on page 120.) Sowing as early as possible after the first Autumn rains is the best time, as it enables the grasses and clovers to establish themselves during the Winter and early Spring, so that by the time irrigation is necessary, their roots have already obtained a firm hold on the soil.

FERTILIZER.—The use of Manure is essential, and where available, natural manures are preferable. When commercial fertilizer is necessary, the best results are obtained from a mixture consisting of two-thirds Superphosphate and one-third Bonedust, used at the rate of from 84 to 120 lbs. per acre. If desired, the seed can be mixed with the fertilizer and sown through the manure hose of the drill, but seed and fertilizer must not be mixed until immediately before sowing.

WHERE IRRIGATION FACILITIES ARE AVAILABLE. A Permanent Pasture Mixture of Approved Grasses and Clovers:—

1. Provides "all the year round" pasture.
2. Increases the stock-carrying capacity of the land.
3. Reduces expense by saving labour in cutting.
4. Is economical in upkeep, no cultivation being necessary.
5. Does not demand the best and deepest soil.
6. Does not cause hoven or bloat.
7. Obviates continued pasturing of Lucerne, which can then be cut for hay and sold.
8. Puts back on the farm in the shape of natural manure, the produce absorbed by the stock.
9. Provides a more balanced ration than Lucerne alone.
10. Is the best and most natural feed for milch cows.
11. Yields milk rich in butter fat and free from taint.
12. Is a tangible asset, increasing the capital value of the holding.
13. Properly treated, is thoroughly permanent.

SEED MIXTURES.—Thick seeding is essential, and it is especially important that only the best quality seed is used. No one particular mixture can be specially adopted as a standard, as variations in soil and other conditions demand that each case shall be specially dealt with. Some specimen mixtures are appended, but it is advisable on all occasions to consult Messrs. F. H. Brunning Pty. Ltd., regarding this important detail, giving particulars of soil conditions, etc.

The following are the grasses and clovers utilized, the quantities and varieties varying according to the conditions:—

Perennial Rye Grass
Italian Rye Grass
Westernwolds Rye Grass
Cocksfoot
Paspalum Dilatatum
Timothy
Creeping Bent

White Clover
Cow Grass Clover
Red Clover
Alsike Clover
Sweet Clover
"Tarwei" Strawberry Clover
Subterranean Clover

The Biennial Rye Grasses are included, owing to their quick maturity, so as to render the maximum utility at the earliest possible moment. A small quantity of Lucerne can also be included with advantage for the same purpose, although the grasses and clovers will kill the Lucerne out within two or three years, by which time it will have more than served the purpose of its inclusion.

The varieties of Clovers are more or less perennial, and as a rule do not manifest themselves in the pasture until the second year. From $\frac{1}{4}$ lb. to 1 lb. per acre of Subterranean Clover undoubtedly enhances the value of the pasture, and this splendid permanent clover should generally be included in all mixtures owing to its adaptability to soil and climatic conditions.

INFERIOR QUALITY SEEDS ARE DEAR AT ANY PRICE

PERMANENT PASTURES FOR IRRIGATION AREAS. (Continued.)

The mixture so successfully established by Mr. P. A. McNulty consisted of 40 lbs. of seed to the acre, made up as follows:—

25 lbs. Ryegrass, Western District, best quality

2 lbs. Alsike

2 lbs. White Clover

2 lbs. Red Clover

9 lbs. Italian Ryegrass

The mixture used and recommended by Mr. A. Glass (see page 120) is:—

20 lbs. Perennial Ryegrass

20 lbs. Italian Ryegrass

4 lbs. Cocksfoot

2 lbs. Red Clover

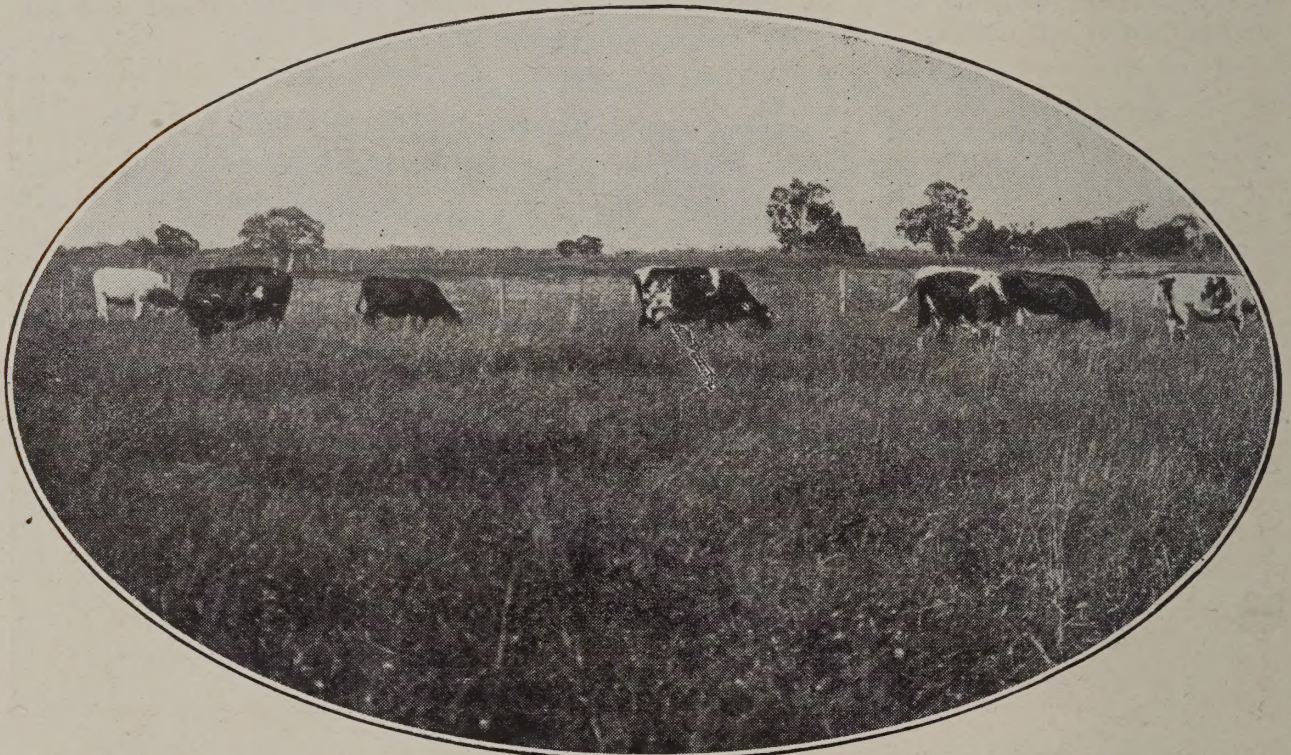
1 lb. Alsike Clover

1 lb. White Clover

2 lbs. Lucerne

$\frac{1}{2}$ lb. Subterranean Clover

This makes a total sowing of 50 $\frac{1}{2}$ lbs. of seed per acre.



A corner in a 9-acre paddock of Permanent Pasture on the property of Mr. Arthur Wallace at Dingee. (See also p. 118.)

Mr. T. S. Edge, of Rochester, writes:—

"The mixture which I have sown is Perennial Ryegrass, Cocksfoot, White Clover, Cow Grass, and sometimes Prairie Grass. I find this mixture has about four times the carrying capacity of Lucerne, and is quite safe for stock, as they never bloat on it. I have not had a case of bloat this six years, and another advantage is that the ground does not get mucky during wet weather or dry out so quickly during hot weather.

"As a general rule I sow—

40 lbs. Perennial Ryegrass

5 lbs. Cocksfoot

5 lbs. White Clover

5 lbs. Cow Grass

This makes a total sowing of 55 lbs. of seed per acre.

From the above reports it will be seen that as a general rule, thick seeding is necessary, and that no one special standard mixture can be adopted, the ingredients being altered according to conditions.

SUBSEQUENT TREATMENT.—To ensure complete success, the subsequent treatment of the pasture must be such as will contribute to the earliest and most complete covering of the ground with a thick sward or mat of pasture. In districts with climatic conditions similar to the Northern areas of Victoria, this must be accomplished before the first hot spell of Summer, to avoid the surface caking of the soil, and to check the excessive evaporation of moisture.

To achieve this end, let a few sheep run in on the grass as soon as it shows up a few inches in the drill tracks, but be careful never to overstock, just feeding off enough so that the grass can keep a little ahead of the stock. The effect of this treatment will soon manifest itself in the manner

FODDER CROPS FOR AUSTRALIA

PERMANENT PASTURES FOR IRRIGATION AREAS. (Continued.)

in which the grass begins to stool across the ground between the drill marks, and soon the whole area will assume something of the appearance of a well-kept city lawn.

Early judicious grazing has been successfully adopted by Mr. Henry Harry at Dingee, and has also been carried out by other Northern District agriculturists. It is also important that the pasture is not allowed to seed itself at first, although early in the Autumn following sowing, the Rye Grass may with advantage be allowed to seed.

The frequency and time of irrigating is one that must be left to individual judgment, the guiding factors being the condition of the soil and the quantity of Summer rainfall. It must be remembered that the grasses and clovers comprising these mixtures are not adapted to droughty conditions, and this deficiency must be made good by supplying a sufficiency of moisture as required, by the artificial means of irrigation.

To avoid the continual grazing, which would be prejudicial to the pastures, it is advisable to fence off the holding into smaller paddocks, which can then be grazed in rotation, thus preserving a continuous succession of available feed.

Finally, to maintain the pasture in first-class condition, read the notes on "Top-dressing," on page 111, and act accordingly, giving the paddocks an application of Superphosphate each year in the early Autumn.

TO KEEP YOUR SOIL FERTILE.

1. Raise Live Stock and feed what you raise.
2. Feed your crops and put back on the soil, the manure produced on the farm.
3. Keep up the supply of Humus by growing annual and permanent legume crops or by using mixtures containing a good proportion of leguminous plants such as, "Mesgawi" Berseem Clover, Hubam, Field Peas, Golden Tares, Tick Beans, Sweet Clover, Cow Peas, Subterranean Clover, Lucerne and "Tarwei" Strawberry Clover.

Essential Operations to Successfully Establish and Maintain a Permanent Pasture Mixture Under Irrigation in the Northern Districts of Victoria.

1. Liming the ground if necessary.
2. Thorough soil preparation to secure a fine, firm, level, shallow seed bed.
3. The selection of a suitable mixture adapted to soil and climatic conditions.
4. The use of only the best seed, sown thickly. (Especially important.)
5. The use of fertilizer, natural manure for preference.
6. Sowing as early as possible after the first Autumn rains.
7. Avoiding deep sowing.
8. Rolling lightly after seeding to compact the seed and soil.
9. The prevention of surface caking of the soil.
10. The checking of excessive evaporation of moisture.
11. Early judicious grazing to achieve Nos. 9 and 10.
12. Preventing the pasture from seeding itself during the first season.
13. Irrigating to supply necessary moisture during dry weather.
14. Fencing off into small paddocks, which can then be grazed in rotation.
15. Top-dressing every Autumn with Superphosphate or Basic Superphosphate.

LIME IS ESSENTIAL TO SUCCESS. PAGES 40, 41

SECTION 6—SEED MIXTURES

BRUNNING'S "INCOMPARABLE" SEED MIXTURES

Experience has now conclusively proved that a scientifically prepared mixture of fodder plants adapted to growing with each other will, in many cases, give very much better results than would be the case if one or even two plants were sown alone. The soil even in the same paddock may vary considerably in both quality and texture, and particularly in such instances a properly prescribed mixture will demonstrate its superiority over any one fodder plant sown by itself.

On second and third class country, the better class grasses and clovers will only stand for two or three years and then die out, but there are other plants suitable for this particular class of soil, and some, such as the Danthonias (Wallaby Grass), are extremely slow in establishing themselves and sown alone, would not be available for use for pasture for a considerable period, hence it is always advisable to include such grasses as these in a mixture with other grasses and clovers which come on quickly and give a good yield of hay or afford pasture during the first season, even should they only last for two or three years, as during that period the slower growing plant is establishing itself, so that when the period of usefulness of the grasses and clovers is exhausted and they are dying out, the other plant laid down for permanency is then available while the land is not rendered idle during the period of establishment.

The question of Seed Mixtures has been made a special study by Brunnings for several years, and all their Seed Mixtures are specially prescribed to suit varying conditions of soil and climate. These remarks have been written more in the sense of laying down Permanent Mixtures, but apply almost equally as much in the course of Annual Fodder Mixtures.

Seed Mixtures may be divided into three distinct classes:—

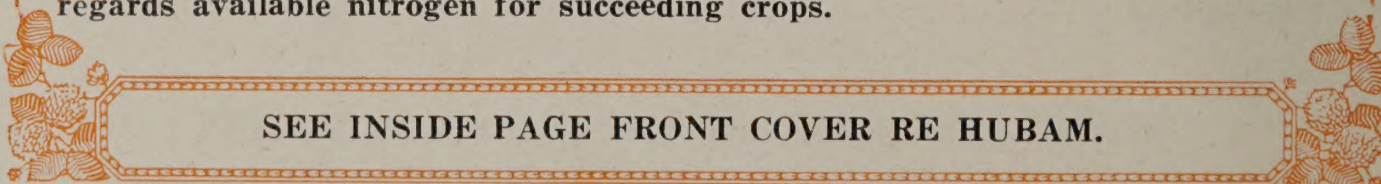
1. Annual Winter Fodder Mixtures.
2. Annual Summer Fodder Mixtures.
3. Permanent Pasture Mixtures.

A note is appended to each specimen mixture shown in this section, detailing the conditions for which the particular mixture is most suited, while the quantity shown in each case **REPRESENTS THE MINIMUM AMOUNT OF FIRST-QUALITY SEED NECESSARY TO ADEQUATELY SOW AN ACRE.** Should none of these particular mixtures be specially suited to the soil and climatic conditions of the land it is proposed to sow down, further information and recommendations will gladly be given on application.

ANNUAL WINTER FODDER CROP MIXTURES

The Annual Winter Fodder Crop Mixtures are perhaps better known as Four Purpose Crops on account of the four purposes for which they can be used, as follows:—

1. They give Winter fodder that can either be cut and fed, or grazed.
2. As the cutting kills the weeds, these mixtures are valuable for cleansing the land.
3. In each of these mixtures, a fair proportion of some legume is included so that the crop can be ploughed in for green manure, thus adding humus to the soil.
4. These mixtures, even when not ploughed under, improve the soil as regards available nitrogen for succeeding crops.



SEE INSIDE PAGE FRONT COVER RE HUBAM.

FODDER CROPS FOR AUSTRALIA

ANNUAL WINTER FODDER CROP MIXTURES. (Continued.)

Mixture No. 1001.

$\frac{1}{2}$ bus. Rye Corn
 $\frac{1}{2}$ bus. Dun Peas
 7 lbs. Golden Tares
 $\frac{1}{2}$ bus. Cape Barley
 $\frac{1}{4}$ bus. Algerian Oats
 (102 lbs. of seed per acre.)

Mixture No. 1003.

$\frac{1}{2}$ bus. Rye Corn
 $\frac{1}{2}$ bus. Partridge Peas
 7 lbs. Golden Tares
 $\frac{1}{2}$ bus. Skinless Barley
 $\frac{1}{4}$ bus. Algerian Oats
 (102 lbs. of seed per acre.)

Mixture No. 1005.

1 bus. Skinless Barley
 15 lbs. Horse Beans
 20 lbs. Italian Ryegrass
 (85 lbs. of seed per acre.)

Mixture No. 1002.

$\frac{1}{2}$ bus. Rye Corn
 $\frac{1}{2}$ bus. Partridge Peas
 7 lbs. Golden Tares
 $\frac{1}{2}$ bus. Skinless Barley
 (92 lbs. of seed per acre.)

Mixture No. 1004.

1 bus. Algerian Oats
 $\frac{1}{2}$ bus. Skinless Barley
 $\frac{1}{2}$ bus. Tick Beans
 $\frac{1}{4}$ bus. Golden Tares
 $\frac{1}{4}$ bus. Dun Peas
 $\frac{1}{4}$ bus. Rye Corn
 (127 $\frac{1}{2}$ lbs. of seed per acre.)

Mixture No. 1006.

4 lbs. Berseem Clover
 $\frac{1}{2}$ bus. Tick Beans
 $\frac{1}{2}$ bus. Algerian Oats
 (54 lbs. of seed per acre.)

Mixture No. 1007.

4 lbs. Berseem Clover
 40 lbs. Skinless Barley
 (44 lbs. of seed per acre.)

No. 1001 is the most suitable Mixture for very cold districts, such as Southern Tasmania. Nos. 1001, 1002, 1003, 1004 and 1005 should all do well in most parts of Australia. Nos. 1006 and 1007, if sown early, will give good results in Gippsland and the Western District of Victoria, but for these districts should be sown before the end of March. Nos. 1006 and 1007 are really best adapted to the Goulburn Valley, the Northern and North-Western parts of Victoria, the Southern Irrigation areas of N.S.W., the River Murray settlements in South Australia, and districts with similarly mild winters, but must be sown early to derive the maximum advantage.

ANNUAL SUMMER FODDER MIXTURES

Annual Summer Fodder Mixtures are often valuable insomuch as they allow a legume to be utilised for nitrifying the soil during the Summer, while at the same time, one of the more drought-resistant Summer fodder plants can be grown in conjunction, to provide green feed or hay, thus utilising the land to its fullest extent and improving the ground between two Winter crops.

The sowing of Annual Summer Fodder Mixtures has not been practised very largely in Australia, but is just as important and equally worthy of consideration for its particular usefulness as the Winter Fodder or Four Purpose Crop Mixtures.

Three good specimen Mixtures are appended herewith:—

Mixture No. 1008.

20 to 30 lbs. of Cow Peas
 2 to 3 lbs. of "GARAWI" Sudan Grass
 (22 to 33 lbs. of seed per acre.)

Mixture No. 1009.

20 to 30 lbs. of Cow Peas
 2 to 3 lbs. of Ambergane
 (22 to 33 lbs. of seed per acre.)

Mixture No. 1010.

28 to 42 lbs. Maize
 30 to 45 lbs. Cow Peas
 (56 to 87 lbs. of seed per acre.)

Mixtures Nos. 1008 and 1009 are really adapted only to the Northern parts of Victoria, but should also be very successful in many parts of N.S.W., S.A., and Queensland. No. 1010 might be successfully utilised in Gippsland and the Western District of Victoria, sowing the Cow Peas about three weeks later than the Maize. The variable quantities depend on whether the seed is being sown in rows 24 inches or 36 inches apart, and provision must be made accordingly. (See also page 22.)

SOW ONLY THE BEST SEED. USE BRUNNINGS.

PERMANENT PASTURE MIXTURES

Permanent Pasture Mixtures may be divided into two classes—those for growing under irrigation (see pages 119 and 123), and those for growing in districts with a fair average rainfall, such as Gippsland, the Western District of Victoria, etc.

PERMANENT PASTURE MIXTURES FOR IRRIGATION AREAS

This special system has been perfected by Messrs. F. H. Brunning Pty. Ltd., and for the operation of laying down, methods of general treatment, etc., the reader is referred to pages 119 to 123. On page 121 the Special Points of Utility of these Mixtures, and on page 123 the Essential Operations to successfully establish and maintain such a Pasture are included.

Mixture No. 1011.

- 25 lbs. Ryegrass, Western District, best quality
 - 2 lbs. Alsike Clover
 - 2 lbs. White Clover
 - 2 lbs. Cow Grass
 - 9 lbs. Italian Ryegrass
- (40 lbs. of seed to the acre.)

Mixture No. 1013.

- 40 lbs. Perennial Ryegrass
 - 5 lbs. Cocksfoot
 - 5 lbs. White Clover
 - 5 lbs. Cow Grass
- (55 lbs. of seed per acre.)

Mixture No. 1015.

- 15 lbs. Perennial Ryegrass
 - 5 lbs. Italian Ryegrass
 - 5 lbs. Westernwold's Ryegrass
 - 4 lbs. Cocksfoot
 - 2 lbs. Cow Grass
 - 1 lb. Alsike Clover
 - 1 lb. White Clover
 - 2 lbs. Hunter River Lucerne, best quality, triple M/D
 - 1 lb. Subterranean Clover
- (36 lbs. of seed per acre.)

Mixture No. 1017.

- | | | |
|----------------------------|----------------------|---------------------|
| 20 lbs. Perennial Ryegrass | 6 lbs. Cocksfoot | 2 lbs. Cow Grass |
| 8 lbs. Timothy | 2 lbs. Alsike Clover | 2 lbs. White Clover |
- (40 lbs. of seed per acre.)

In every case the best quality Perennial Ryegrass must be used.

Mixture No. 1012.

- 20 lbs. Perennial Ryegrass
 - 20 lbs. Italian Ryegrass
 - 4 lbs. Cocksfoot
 - 2 lbs. Cow Grass
 - 1 lb. Alsike Clover
 - 1 lb. White Clover
 - 2 lbs. Lucerne
 - $\frac{1}{2}$ lb. Subterranean Clover
- (50½ lbs. of seed per acre.)

Mixture No. 1014.

- 25 lbs. Perennial Ryegrass
 - 5 lbs. Italian Ryegrass
 - 5 lbs. Westernwold's Ryegrass
 - 4 lbs. Cocksfoot
 - 3 lbs. Creeping Bent
 - 1 lb. White Clover
 - 1½ lbs. Alsike Clover
 - $\frac{1}{2}$ lb. "TARWEI" Strawberry Clover
- (45 lbs. of seed per acre.)

Mixture No. 1016.

- 20 lbs. Perennial Ryegrass
 - 10 lbs. Italian Ryegrass
 - 5 lbs. Cocksfoot
 - 2 lbs. White Clover
 - 1½ lbs. Sweet Clover
 - 1½ lbs. Cow Grass
 - $\frac{1}{2}$ lb. Subterranean Clover
 - 1½ lbs. Alsike Clover
- (42 lbs. of seed per acre.)

It must be remembered that these Mixtures (Nos. 1011 to 1017) are specially designed for sowing in such places as the Goulburn Valley and the Northern Districts of Victoria where irrigation is available. No. 1011 is the one used so successfully by Mr. P. A. McAnulty, Stanhope (see page 120); Mixture No. 1012 is recommended by Mr. A. Glass, Nanneella; while Mixture No. 1013 was established with such satisfaction by Mr. T. S. Edge, Rochester (see page 119); Mixture No. 1014 is for land inclined to be swampy; while Nos. 1015 and 1016 are good general Mixtures. No. 1015 contains Hunter River Lucerne and Italian Ryegrass so as to get a quick stand, while in No. 1016 the Lucerne has been omitted and Sweet Clover included. On this account, No. 1016 is a particularly good mixture for sowing on, perhaps, medium-quality land only. The reader is also referred to the paragraph at the foot of page 121 regarding the inclusion or otherwise of Lucerne in these mixtures. No. 1017 is a particularly good mixture, especially where the pasture is being relied on for hay. No. 1017 can also be used for general purposes.

GENERAL PERMANENT PASTURE MIXTURES

The Mixtures are designed for growing in districts without irrigation and with a fair average rainfall, such as Gippsland and the Western District of Victoria.

Mixture No. 1018.

25 lbs. Perennial Ryegrass
10 lbs. Cocksfoot
2 lbs. White Dutch Clover
2 lbs. Cow Grass
1 lb. Alsike Clover
(40 lbs. of seed per acre.)

Mixture No. 1020.

20 lbs. Perennial Ryegrass
4 lbs. Subterranean Clover
2 lbs. Rape
(26 lbs. of seed per acre.)

Mixture No. 1022.

20 lbs. Perennial Ryegrass
5 lbs. Cocksfoot
1 lb. White Clover
1 lb. Cow Grass
1 lb. Alsike Clover
5 lbs. Wallaby Grass (preferably Pilosa)
(33 lbs. of seed per acre.)

Mixture No. 1024.

5 lbs. Timothy
5 lbs. Sweet Clover
2 lbs. Alsike
20 lbs. Perennial Ryegrass
(32 lbs. of seed per acre.)

Mixture No. 1026.

10 lbs. Cocksfoot
5 lbs. Sweet Clover
3 lbs. Creeping Bent
1½ lbs. Alsike Clover
½ lb. "TARWEI" Strawberry Clover
(20 lbs. of seed per acre.)

Mixture No. 1019.

20 lbs. Perennial Ryegrass
10 lbs. Cocksfoot
1 lb. White Clover
1 lb. Cow Grass
1 lb. Alsike Clover
1 lb. Subterranean Clover
(34 lbs. of seed per acre.)

Mixture No. 1021.

20 lbs. Italian Ryegrass
4 lbs. Subterranean Clover
40 lbs. Skinless Barley
(64 lbs. of seed per acre.)

Mixture No. 1023.

20 lbs. Perennial Ryegrass
7 lbs. Cocksfoot
2 lbs. Kentucky Blue Grass
2 lbs. Chewings Fescue
2 lbs. Cow Grass
2 lbs. Sweet Clover
1 lb. Subterranean Clover
(36 lbs. of seed per acre.)

Mixture No. 1025.

15 lbs. Perennial Ryegrass
4 lbs. Timothy
3 lbs. Creeping Plant
2 lbs. Paspalum Dilatum
4 lbs. Sweet Clover
1 lb. White Clover
1 lb. Alsike Clover
(30 lbs. of seed per acre.)

Mixture No. 1027.

20 lbs. Old Pasture Ryegrass
3 lbs. Creeping Bent
½ lb. Alsike Clover
1 lb. "TARWEI" Strawberry Clover
(24½ lbs. of seed per acre.)

Mixtures 1018 and 1019 are good general Permanent Pasture Mixtures suitable preferably to Gippsland, but also adapted to Western District conditions. No. 1018 represents the "Standard" basis of the older Permanent Pasture Mixtures. Mixtures 1020 and 1021 have been made up as a base for establishing Subterranean Clover. Mixture 1020 is suitable for Gippsland and the Western District as well as for colder districts such as Southern Tasmania, while Mixture 1021 is suitable for temperate to warm climates. Mixture 1022 has been made up for second and third-class country that will only carry Ryegrass, Cocksfoot and the better Clovers for two or three years by which time the Wallaby Grass (*Danthonia Pilosa*) will have thoroughly established itself. This mixture is exceptionally well suited to poor, dry, hilly land in colder climates, especially where a good sheep pasture is required. Mixture 1023 is suitable for good land in rather dry situations, and also for worn-out ground, Sweet Clover being included for this purpose. Mixture 1024 is suitable for first-class soil, and could be utilised very satisfactorily in the Northern areas of Victoria or in the Southern parts of New South Wales for growing under irrigation. It will also give good results in Southern Victoria as well as in Tasmania. Mixture 1025 is suitable for medium to good quality soil in temperate climates with a fair rainfall, or can be grown in warmer districts on medium-class land that is slightly moist. Mixture 1026 is suitable for wet or acid soils, while Mixture 1027 is suitable for heavy black, loamy ground within 50 miles of the seashore, for drained peaty swamps and for land liable to flood. This mixtures gives good results in the coastal districts of Gippsland, in the Western District of Victoria, and in the coastal districts of Tasmania.

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F. H. BRUNNING Pty. Ltd.
64 ELIZABETH ST., MELBOURNE

26th February, 1922.

You were good enough to forward me, last November, some information re Clover, and also a sample packet of Hubam.

This was planted at the time of receipt, and gave more excellent results.

Let me know if you have any Hubam seed for sale; if so, and if not too horribly expensive, send me 1 lb.

Yours faithfully,

(Sgd.) DR. S. CROWNSON JOEL.
Bunbury, W.A.

7th January, 1922.

"The sample of 'Hubam' and Melilotus Alba were planted in plots side by side. The ground is older—volcanic in the Thorpdale-Narracan district—elevation about 1,000 ft. above sea level.

"The summer this year has been cool, but both plots have grown freely, and the plots are now like Lucerne patches.

"I have previously grown a considerable quantity of White Sweet Clover, and it does well in the district, but will be able, at the end of the season, to say more about Hubam."

(Sgd.) DONALD CLARK, East View, Bates St., East Malvern..

27th January, 1922.

"Under separate cover I am forwarding sample of one plant each—Hubam, Bokhara and King's Is. All appear to be Melilotus.

"These were all sown on the 16th November. None have received artificial watering, so that growth, under the circumstances, is abnormal. Hubam, it seems to me, will prove all that American farmers claim for it."

(Sgd.) J. H. REFSHAUGE, High School, Ballarat.

4th February, 1922.

"The experimental plot of Hubam, at the above farm, has done remarkably well, and compared with other varieties of Melilotus, is superior as a fodder, as it has less fibre and greater leafage. Dairy stock appreciate it as a green fodder, and it is as readily converted into hay as Lucerne, for which the same care is needed in curing and harvesting.

"Judging from the great numbers and the large size of the nitrogen-fixing tubercles upon the root system of the plants, it should prove one of the best soil renovators."

(Sgd.) J. H. REFSHAUGE, Agricultural High School, Ballarat.

These reports are extremely interesting, and although, perhaps, hardly final, testify to the fact that Hubam is going to live up to its American reputation under Australian conditions.

The reports cover the Swan Hill and Rochester districts in the North of Victoria, Stanhope in the Goulburn Valley, Thorpdale in North Gippsland, Ensay in East Gippsland, and Ballarat.

The opinions given being those of successful practical men can be accepted as thoroughly reliable and typical of what "Hubam" is going to do under the particular climatic conditions ruling in the districts mentioned above.

From these reports, it appears as if Hubam needs to be sown early in districts with a mild Winter and dry Summer but late (October) in those regions with medium to severe Winters and a good Summer rainfall, such as Gippsland.

Where Irrigation is available, it appears as if Hubam can be sown any time from the middle of August to the end of October.

Hubam appears to be an all round plant, being suitable for grazing and for cutting to feed green, it yields good hay and as a quick short period soil renovator it appears to hold wonderful possibilities. Hubam can be sown in some districts in October and plowed under in April thus nitrifying the ground and supplying it with "Humus" in a brief space of time and allowing the previous Winter crop to be taken and a crop to be seeded for the succeeding Winter without any loss of the use of the land.

The seed will be high in price during the first season, but as "Hubam" is such a heavy seeder, it is quite likely that in a year or two, seed of Hubam will be selling at about the same or even at a lower price than Lucerne or Melilotus Alba.

LESLIE H. BRUNNING



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